DEPARTMENT OF DEFENSE

MAJOR RANGE AND TEST FACILITY BASE

SUMMARY OF CAPABILITIES

JUNE 1983

UNDER SECRETARY OF DEFENSE
FOR RESEARCH AND ENGINEERING

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RESEARCH AND
ENGINEERING

June 17, 1983

FOREWORD

This Directory is issued under the authority of DoD Directive 3200.11, "Major Range and Test Facility Base," September 29, 1980. Its purpose is to provide a brief description of DoD major test activities identified in DoD Directive 3200.11. The Directory includes an overview of the mission and capability of each activity, with a point of contact for prospective users desiring additional information.

The major ranges and test facilities constitute a national asset--sized, operated, and maintained under uniform policies for DoD test and evaluation support missions. Because of the unique capabilities and expertise of these activities, they also may be used in support of other U.S. Government agencies, allied foreign governments, and private organizations.

This Directory applies to the Office of the Secretary of Defense, the Military Departments, the Organization of the Joint Chiefs of Staff, and the Defense Agencies (hereafter called "DoD Components").

The Directory is effective immediately.

Send recommended changes to the Directory, through channels, to the following:

Office of the Under Secretary of Defense for Research
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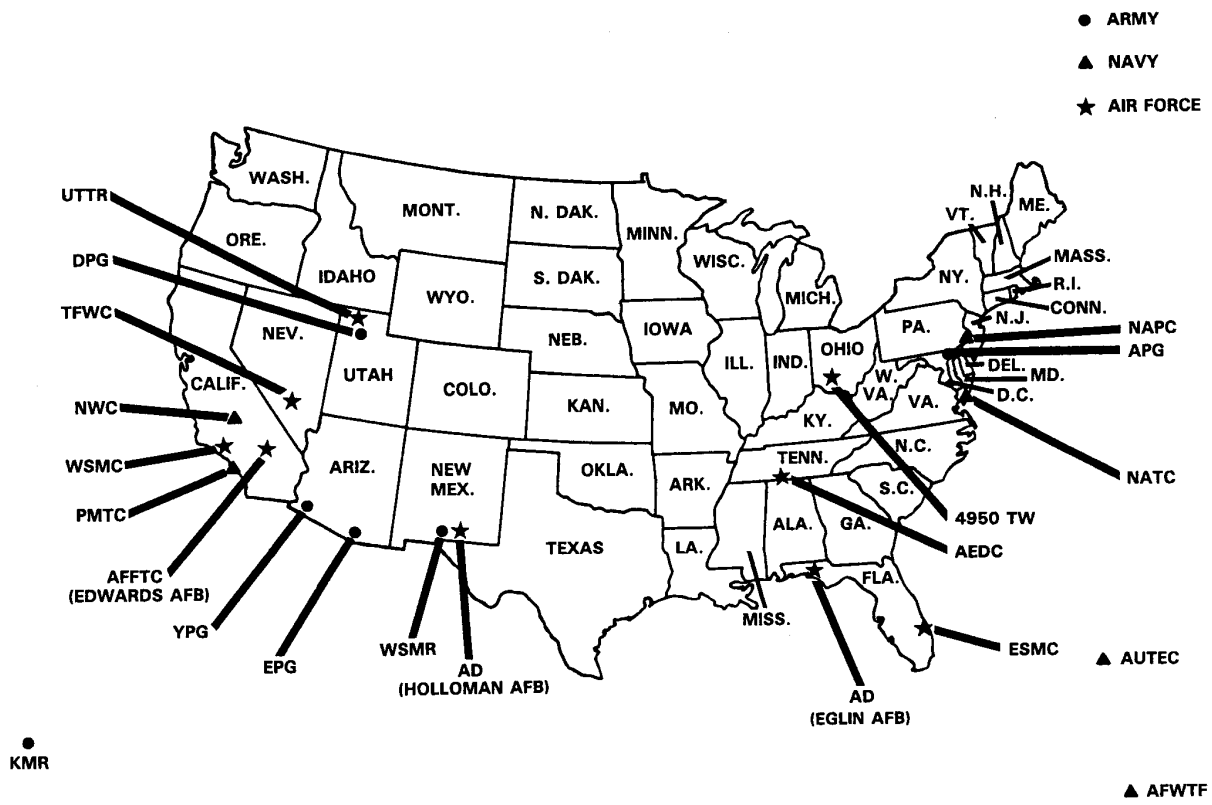
Attention: ODDTF&R
Room 3D1031, The Pentagon
Washington, D.C. 20301

DoD Components may obtain copies of the Directory through their own publications channels. Other federal agencies and the public may obtain copies from the Director, U.S. Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

ISHAM LINDER
Director Defense
Test and Evaluation



DOD MAJOR RANGE AND TEST FACILITY BASE LOCATION OF ACTIVITIES

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C1. CHAPTER 1

WHITE SANDS MISSILE RANGE

C1.1. MISSION

Provides and operates an overland range to support research and development (R&D) testing of the Army, the Navy, the Air Force, the National Aeronautics and Space Administration (NASA), and other approved U.S. Government Agencies and foreign governments. Plans and conducts development testing and evaluation of Army missiles, rockets, and materiel systems. Controls and monitors all electromagnetic radiation devices on and adjacent to the range. Conducts R&D of range instrumentation.

C1.2. LOCATION

The White Sands Missile Range (WSMR) is located in south-central New Mexico. The headquarters area, in the southwest corner, is located 50 miles north of El Paso, Texas, and 25 miles northeast of Las Cruces, New Mexico. Extended-range launch complexes are located in southeast Utah and southwest Idaho.

C1.3. CAPABILITIES

C1.3.1. Land Mass. The main area of the WSMR under Government control is 40 miles wide east to west and 100 miles long south to north. Another 40-mile area contiguous to the north end of the range can be called up under lease agreements. Extended range facilities are located in southeast Utah (approximately 500 miles ground range) and in southwest Idaho (approximately 800 miles ground range).

C1.3.2. Technical Expertise. The many categories of weapon systems testing include surface-to-surface, surface-to-air, air-to-surface, air-to-air, and low-altitude cruise systems, high-altitude probes, antiballistic missiles, reentry vehicles, nuclear effects testing (including high-explosive effects), and automation of airborne and surface targets to facilitate tactical realism. Internal and external instrumentation support systems can be configured to gather continuous data throughout the test.

C1.3.3. Instrumentation. Over 2,000 monumented instrumentation points surveyed to an accuracy of 1/250,000 to 1/1,000,000 are located within the main area. An ongoing effort in mobilizing instrumentation systems affords the WSMR the capability to configure instrumentation support to test requirements. These systems include optics, radar, telemetry, communications, and computational control.

C1.3.4. Laboratories. Operates and maintains laboratories and facilities to produce and examine the effects of climate, weather, the upper atmosphere, transportation, seismic shock and vibration, static electricity, electromagnetic radiation, nuclear detonations, and electronic or optical countermeasures on selected systems and components. Hazardous test facilities have been centralized and relocated at the south end of the main area. Mobile equipment is available to combine multiple climatic, dynamic, and electromagnetic testing of materiel at the firing areas and launch pads. Computer-simulated testing of weapon systems can be performed before actual firings are accomplished.

C1.3.5. High-Energy Laser Test Facility. A DoD facility being constructed in the southern portion of the main area will have the capability to test and evaluate the new family of directed energy devices.

C1.3.6. Test Areas. The majority of the surface-launch facilities are located along the southern portion of the main area. High-speed, high-precision optical systems are concentrated in this area to support the initial trajectory requirements. Air-to-air and air-to-surface testing is conducted in the mid-range area where long focal-length optics are available. Two hazardous impact areas are located in the mid and upper area of the range, which are used for impacts of various ground-launched and air-launched missiles. The terrain is generally flat, sandy desert with sparse ground cover, which facilitates recovery of test items. Extended range testing from Utah and Idaho can be supported with mobile instrumentation systems configured for the particular test requirements.

C1.3.7. Tenant Organizations. Various tenant organizations provide an additional level of expertise and capabilities. Organizations such as the Navy, the Air Force, NASA, the Atmospheric Science Laboratory, the Office of Missile Electronic Warfare, and the Office of Test Director conduct tests and support ongoing testing.

C1.4. TYPICAL PROJECTS SUPPORTED

C1.4.1. PERSHING Ia and II Army Surface-to-Surface Missile.

C1.4.2. NIKE ZEUS/SPRINT/LOADS - Ballistic Missile Defense System.

C1.4.3. HAWK/PATRIOT/STINGER/CHAPARRAL - Army Surface-to-Air Missile.

C1.4.4. Standard Missile Test - Navy - Surface-to-Air.

C1.4.5. AEROBEE 150/350 - Navy - Surface-to-Air.

C1.4.6. Space Shuttle - NASA.

C1.4.7. AIM 7/9 Series - Air Force - Air-to-Air Missile.

C1.4.8. Advance Location Strike System - Air Force - Air-to-Surface.

C1.4.9. Short Range Attack Missile - Air Force - Air-to-Surface.

C1.4.10. Defense Nuclear Agency - High-Explosive Testing.

C1.5. POINT OF CONTACT

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U.S. Army White Sands Missile Range
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White Sands Missile Range, NM
Telephone: AUTOVON: 258-5755/3715
Commercial: 915-678-5755/3715

Figure C1.F1. White Sands Missile Range, New Mexico

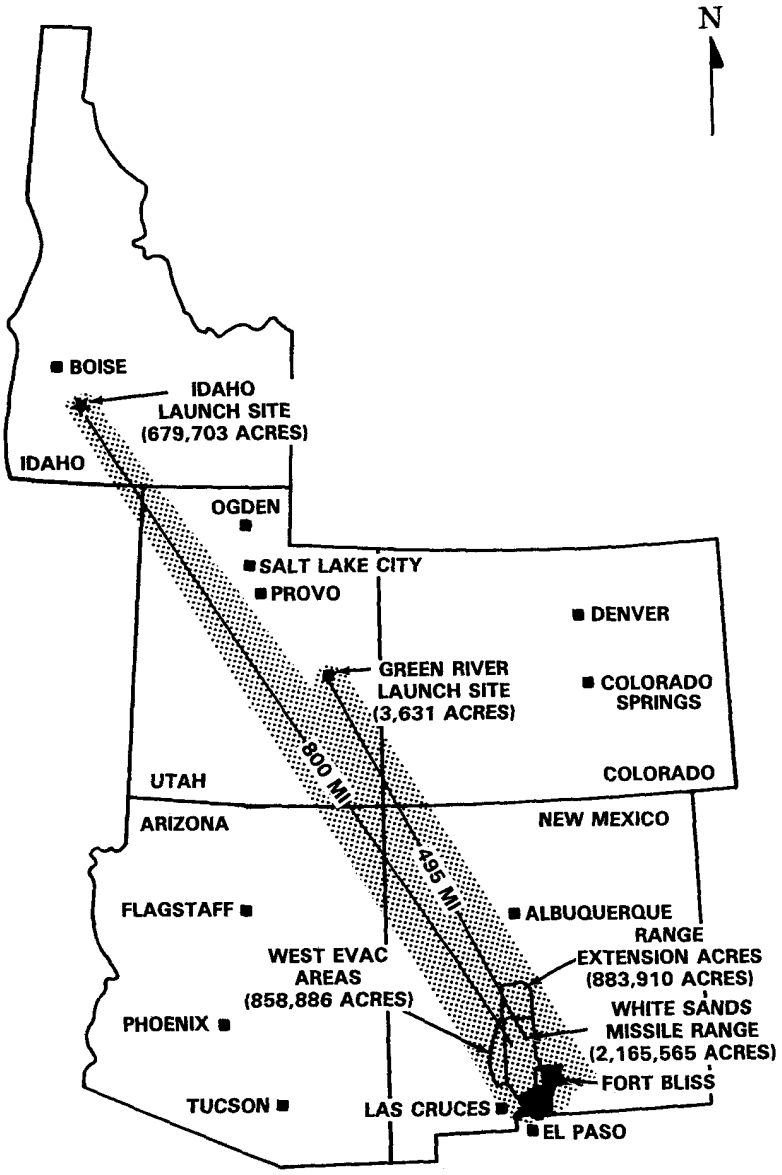
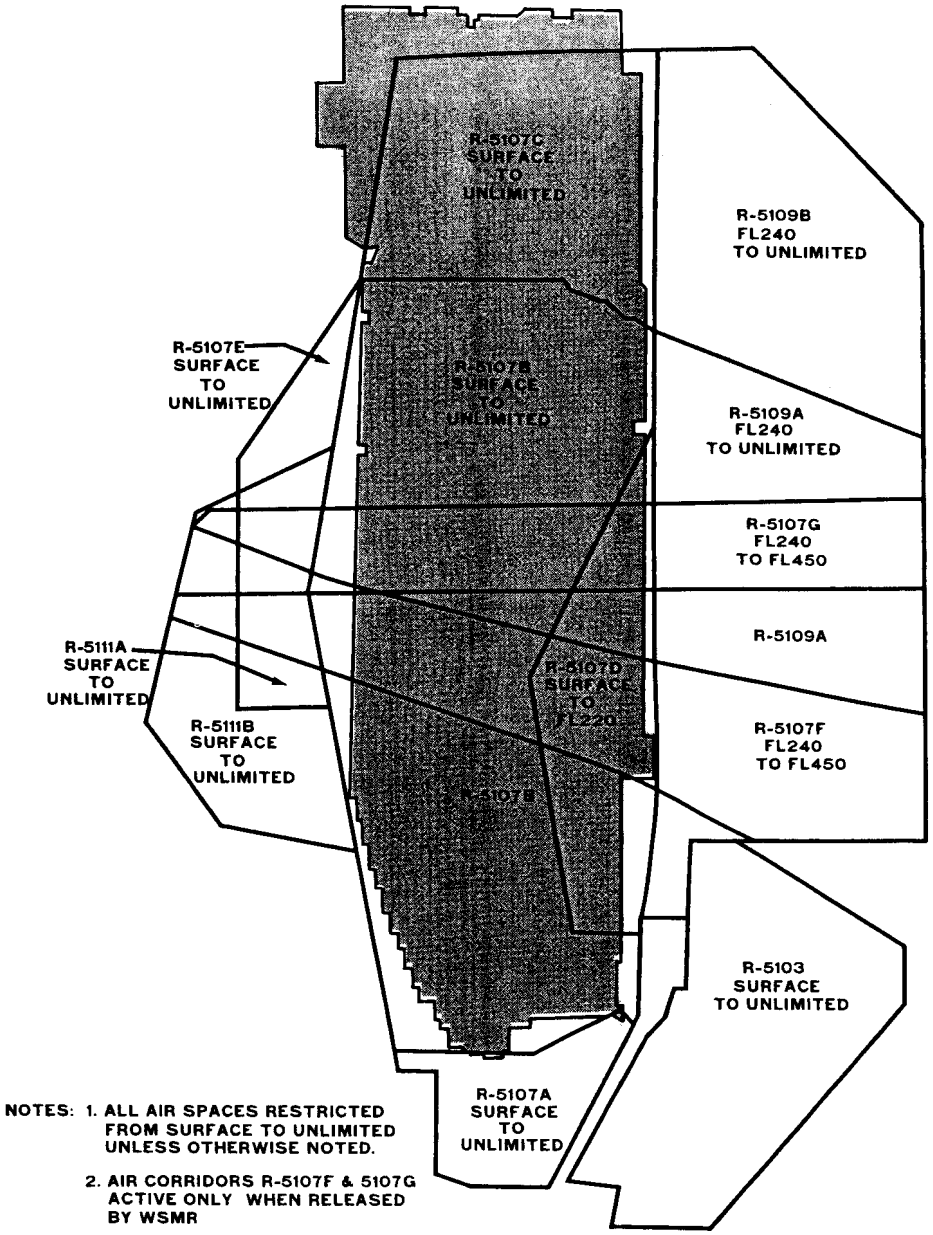


Figure C1.F2. WSMR Restricted Air Space Areas



C2. CHAPTER 2

KWAJALEIN MISSILE RANGE

C2.1. MISSION

Provides and operates a national range in the Kwajalein Atoll to support onsite ballistic missile defense R&D programs, strategic offensive weapon system developmental and operational testing, and data collection for the DoD intelligence community.

C2.2. LOCATION

The Kwajalein Missile Range (KMR) is located in the Pacific Ocean at the Kwajalein Atoll, 600 miles north of the equator; 2,200 miles southwest of Hawaii; and 4,300 miles from the California coast.

C2.3. CAPABILITIES

C2.3.1. Strategic Offensive Weapon System Development and Operational Testing. The location of Kwajalein (that is, the range from the California coast), low density of populated areas, large lagoon area for recovery operations, and complement of state-of-the-art instrumentation provide the capability for realistic operational testing and development of strategic offensive and defensive weapon systems.

C2.3.2. Intercontinental Ballistic Missile Target Area. Since the KMR serves as a target area for major intercontinental ballistic missile (ICBM) systems, it is an ideal location for studying and collecting data on reentry phenomena. Major ballistic missile defense (BMD) facilities have been located at the KMR since 1961 and have been collecting data for technology development and testing candidate systems in a realistic environment.

C2.3.3. Intelligence Data Collection. The location of the KMR and its sophisticated instrumentation make it a prime station for early detection of foreign launches and tracking during early orbits or precise trajectory and signature measurements of suborbital launches. The Kiernan Reentry Measurements Site (KREMS) complex also is available for space object identification through radar-imaging techniques.

C2.3.4. Extended Range Support. A capability has been developed, in support of the Peacekeeper ICBM program, to score reentry vehicle impacts in the broad ocean area near the KHR. Deep ocean transponders have been implanted and accurately surveyed; these communicate with surface sonobuoys. The sonobuoys transmit impact data to a receiver system aboard KMR Caribou aircraft. Low-altitude telemetry data also is collected from antenna and receivers onboard the KMR aircraft.

C2.3.5. Kiernan Reentry Measurements Site. Extremely sophisticated radar systems, that is, Target Resolution and Discrimination Experiment (TRADEX), ARPA Lincoln C-Band Observable Radar (ALCOR), and ARPA Long-Range Tracking and Instrumentation Radar (ALTAIR), are located on Roi-Namur Island at the northern tip of the Kwajalein Atoll. These systems provide a wide spectrum of radar measurements for analysis. The Millimeter Wave Radar, completed in early 1983, expands these capabilities.

C2.3.6. Metric Data. The KMR has the capability to determine the position of a reentering vehicle to extreme accuracy by combining data from one or multiple radar systems with data from highly sophisticated optical systems, such as Super Recording Automatic Digital Optical Tracker (RADOT). Six Super RADOTs and six ballistic cameras collect angle data.

C2.3.7. Scoring. Two splash-detection radars provide coverage both inside and outside the lagoon. In addition, bottom-mounted hydrophones provide both scoring data and time-of-impact data.

C2.3.8. Recovery. The Kwajalein Atoll encompasses the worlds largest lagoon; average water depth inside this lagoon is about 200 feet. By using a small submarine, a well-equipped diving barge, and scuba divers, reentry vehicles are recovered routinely.

C2.3.9. Telemetry. Eight tracking antennas optimally located with multiple receivers, polarization diversity, decommutators, recorders, data separation, and display systems provide the telemetry reception capability.

C2.3.10. Communications. A digital microwave system interconnects range and range user instrumentation facilities with voice and data-handling capabilities up to 44.736 mb/s. An AN/FSC-78 satellite ground station provides up to 24 voice and data channels between the KMR and Camp Roberts, California; 24 voice and data channels between the KNR and Wahiawa, Hawaii; and one high-speed data channel (1.544 mb/s) between the KMR and New Boston, New Hampshire. The high-speed data transmission capabilities in use at the KMR are highly flexible and can be adapted to varying range user requirements.

C2.4. TYPICAL PROJECTS SUPPORTED

C2.4.1. NIKE-ZEUS/NIKE-X/SENTINEL/Safeguard Ballistic Missile Defense Systems.

C2.4.2. MINUTEMAN I, II, and III - Air Force ICBM Systems, Developmental and Operational.

C2.4.3. POLARIS - Navy SLBM Systems, Developmental and Operational.

C2.4.4. Advanced Ballistic Reentry Systems (ABRES).

C2.4.5. Army BMD Advanced Technology Programs (SOFT, DOT).

C2.4.6. Defense Nuclear Agency Test Programs.

C2.5. POINT OF CONTACT

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Ballistic Missile Defense Systems Command
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Commercial: 205-895-3100

Figure C2.F1. Kwajalein Atoll

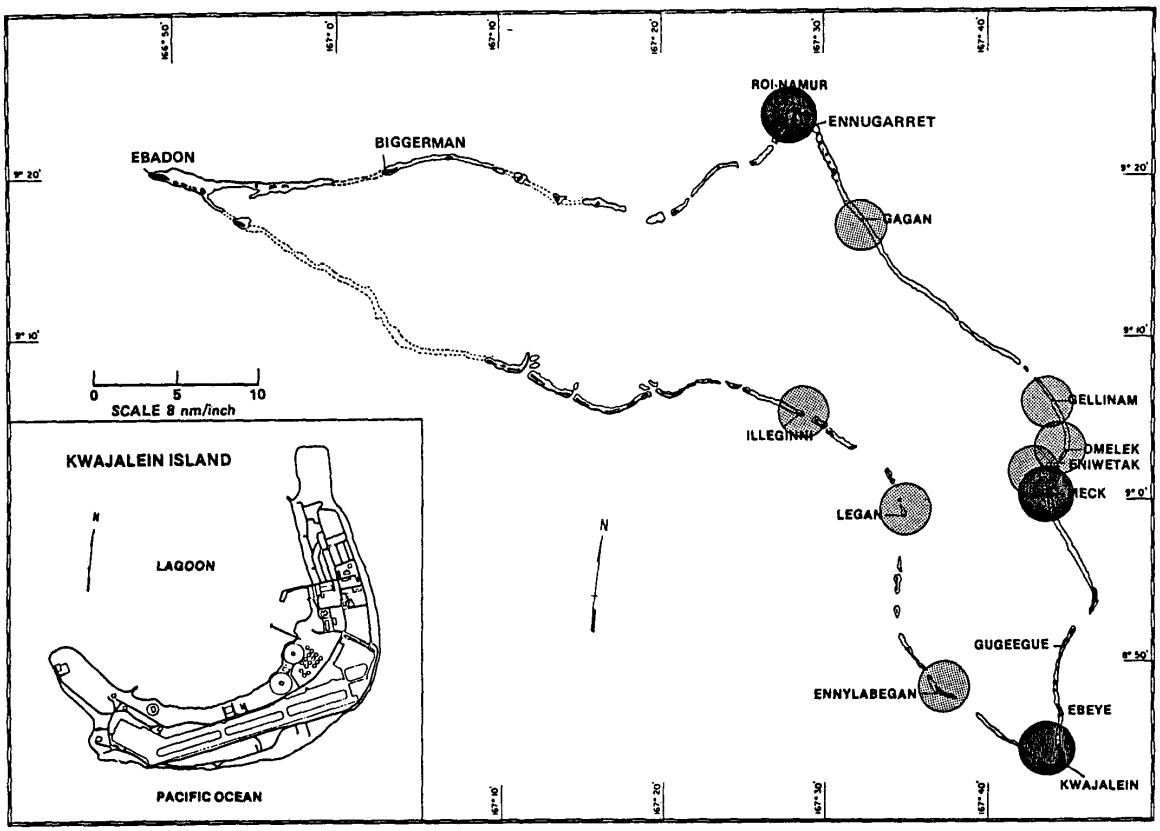
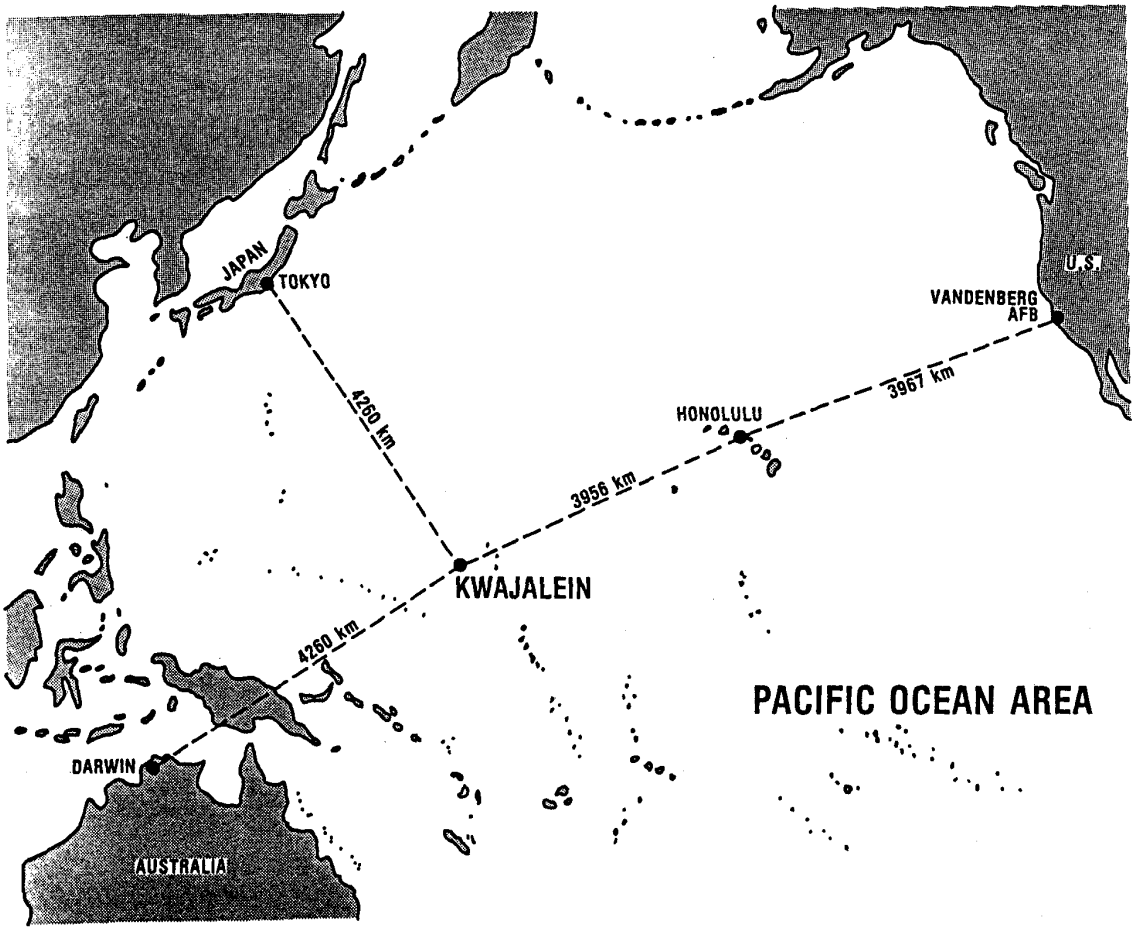


Figure C2.F2. Pacific Ocean Area



C3. CHAPTER 3

YUMA PROVING GROUND

C3.1. MISSION

Supports the testing of long-range tube artillery, aircraft armament and air delivery systems and equipments, air movable equipments, and natural desert environmental phases of development testing of all classes of defense materiel for the Department of Defense and other Government Agencies.

C3.2. LOCATION

The Yuma Proving Ground (YPG) comprises 1,400 square miles of land next to the Colorado River in the southwestern part of Arizona.

C3.3. CAPABILITIES

C3.3.1. The Sonora Desert, in which the YPG is located, is comparable to the great deserts of the world. The area is an ideal location for testing materiel in a desert environment.

C3.3.2. The Aircraft Armaments Range is a fully instrumented air-to-ground and ground-to-ground aircraft armament test range with electronic and optical instrumentation, including six precision aircraft tracking systems (PATS-laser tracker), tracking radars, and video scoring. The range has six sites from which the position of missile-firing aircraft can be established by position-locating system radars and trajectories of missiles measured.

C3.3.3. The Artillery Firing Range consists of three primary test areas:

C3.3.3.1. The Main Front area with 21 permanent firing positions, ammunition storage and preparation, and environmental simulation facilities.

C3.3.3.2. Terminal Ballistics Evaluation Area with prepared and instrument impact area.

C3.3.3.3. Extended Range Munitions Area. Maximum range attainable is 75,000 meters with 65,000 meters under tracking surveillance.

C3.3.4. The Air Delivery Test Area permits total air drop and air transportability (under the connotation of air delivery) testing of all classes of materiel (including ammunition). Tests are conducted using three separate drop zones and a water impact zone for dynamic testing from aircraft, and a controlled impact facility for static (free-fall) drop testing of materiel up to 35,000 pounds from heights of 70 feet. All drop zones in the area are fully equipped with electronic and optical instrumentation.

C3.3.5. The Automatic Weapons and Ammunition Test Ranges provide up to 4,500 meters of direct fire at large (30 feet by 60 feet) variable-obliquity armor, cloth, and aluminum plate targets; horizontal impact areas up to 500 meters square; and sod, disced earth, mud, sand, and macadam fuze graze function targets. Movable firing positions provide complete facilities for test operations, instrumentation, and ammunition conditioning. Any degree of elevation can be allowed to ranges of 10,000 meters or more.

C3.3.6. The Navigation System Evaluation Range is a 15- by 60-kilometer instrumented range configured to provide real-time space position and event data of moving aerial and ground platforms for the evaluation of navigation systems.

C3.3.7. The Moving Target Range features a remote-controlled, rail-mounted, target with speeds up to 30 miles per hour for testing of ground vehicle-direct fire weapons at ranges up to 3,000 meters and aircraft weapon at slant ranges up to 5,000 meters.

C3.3.8. The Vehicle Performance Measurement Facilities are eight special test courses over natural desert terrain, prepared test slopes and obstacles, a 2-mile paved dynamometer course, water spray simulation, vehicle swimming basins, mud basin, and extensive instrumentation for testing wheel and tracked vehicles, components, fuels, and lubricants.

C3.3.9. The Climate Simulation Facilities comprise seven environmental chambers available for various exposures, including high and low temperature, humidity, altitude, and salt fog. One, the Large Multipurpose Environmental Chamber, has three firing ports for functioning weapons systems up to 40 millimeters under controlled climatic conditions.

C3.3.10. The Real-Time Data Acquisition System is an extensive state-of-the-art system recently brought online. The field instrumentation consists of four installed laser trackers, two radars, three meteorological towers, and a position locating system, all sending data in real time to two real-time computers driving a graphics display

network having five cathode ray tubes (CRTs). Four such display networks are planned by the end of 1983, giving a four simultaneous mission control capability.

C3.4. TYPICAL PROJECTS SUPPORTED

C3.4.1. Heliborne Missile (HELLFIRE).

C3.4.2. Tube-launched, Optically Tracked, Wire Command/COBRA Air-to-Ground Missile System.

C3.4.3. LANCE Ground-to-Ground Missile System.

C3.4.4. M1 ABRAMS Tank.

C3.4.5. Trucks for Bradley Fighting Vehicle System.

C3.4.6. Ammunition Projectiles (warheads/fuzes).

C3.4.7. NAVSTAR/GPS.

C3.4.8. Advanced Attack Helicopter.

C3.4.9. Tactical Trucks.

C3.5. POINT OF CONTACT

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Commercial: 602-328-3111

Figure C3.F1. Yuma Proving Ground Airspace Reservations

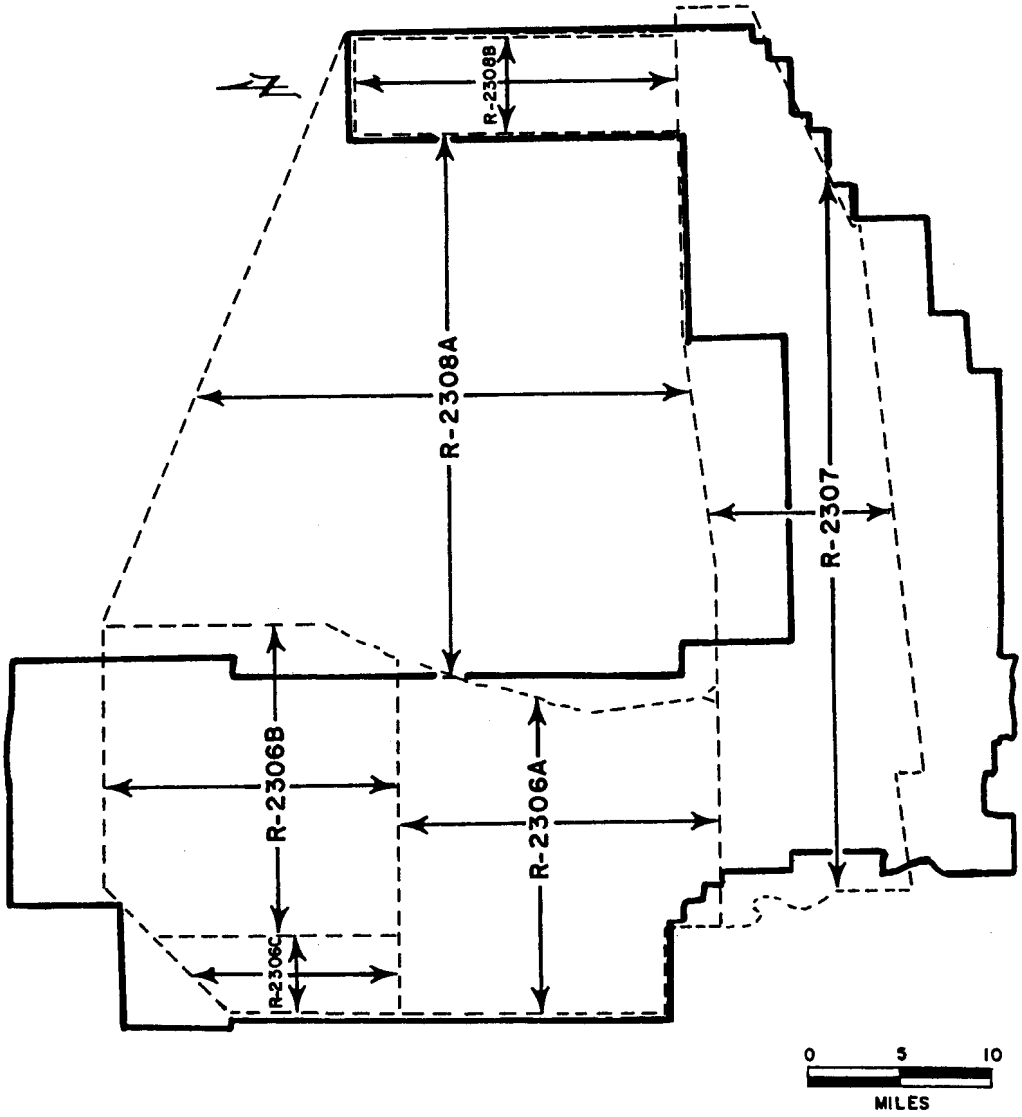
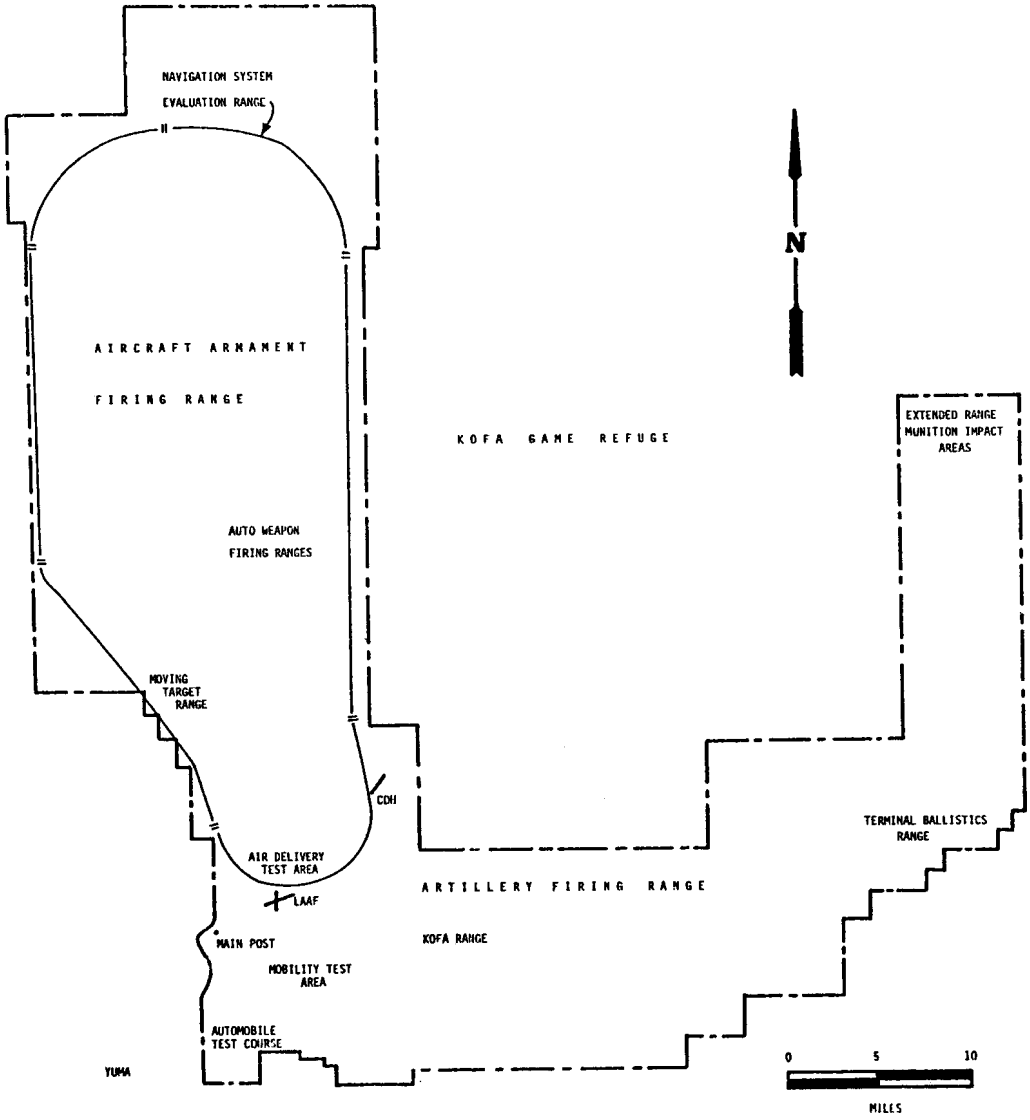


Figure C3.F2. Yuma Proving Ground



C4. CHAPTER 4

DUGWAY PROVING GROUND

C4.1. MISSION

The Dugway Proving Ground (DPG) has unique capabilities for testing chemical warfare and biological defensive systems and protective items, for testing of incendiary devices, and for characterization of smokes and obscurants and relevant systems. The DPG also is involved in testing of conventional munitions, air vehicle testing, and a variety of other test support activities.

C4.2. LOCATION

Dugway Proving Ground, Utah, is located 87 miles southwest of Salt Lake City. It comprises 1,315 square miles contiguous to 900 square miles of Air Force test ranges and extensive, unoccupied, federally owned land.

C4.3. CAPABILITIES

C4.3.1. Technical Expertise. Expertise in all phases of chemical and biological R&D planning, testing, and evaluation has been acquired over many years. Other technical expertise extends to instrumentation, munitions (including instrumented), electronics, aircraft tracking, smoke and obscurants, and meteorology and operations research.

C4.3.2. Laboratories. The DPG has two large laboratories for challenging, testing, and performing research in chemical warfare and biological defense programs. The chemical laboratory complex is in compliance with Army Regulation 50-6, "Chemical Surety Program," and is used to test small items or components in a toxic chemical environment. The Life Science Laboratory complex is uniquely designed to test biological detection and protection systems with pathogens and simulants.

C4.3.3. Test Grids and Facilities. The DPG has extensive test grids and facilities uniquely designed for testing and evaluating chemical warfare, biological defense, and smoke and obscurant systems.

C4.3.3.1. Carr Facility, Building 3008. Two rooms in this facility are designed so that items of equipment can be tested in a chemical environment.

C4.3.3.2. Defensive Test Chamber. The chamber provides a self-contained, controlled environment permitting entire items and systems to be subjected to various chemical, biological, and environmental challenges (temperature, humidity, rain, wind, and solar radiation). The chamber (30 by 50 by 20 feet) can accommodate equipment up to the size of an M1 tank.

C4.3.3.3. Tower Grid. This grid is used for chemical field tests to determine munitions efficiencies and behavior from a point source release. Howitzer rounds or rockets are fired from platforms to detonate in the center of the grid. Concentration of airborne vapor, particulates, and liquids can be determined.

C4.3.3.4. Aerial Spray Grid (ASG). This area consists of three separate grids (ASG, Downwind Grid, and Ballistics Grid) for testing aerial spray tanks.

C4.3.3.5. West Vertical Grid. This grid is used for small point source detonated chemical munitions and particulate dissemination to study area dosage patterns.

C4.3.3.6. All Purpose Grid (APG). This grid is used in evaluation of aerial spray, bomb release, multiple-point sources, and ground line sources.

C4.3.3.7. Horizontal or Smoke Grid. This unique grid is used for the test and evaluation of both fixed and dynamic smoke generating sources. Highly specialized instrumentation determines particle sizes, light transmission, and obscuration.

C4.3.4. Physical Test Support. The DPG has 20 mobile and fixed environmental chambers, including altitude, temperature, humidity, and fungus. Equipment for X-ray, vibration, shock, inertia, and center of gravity is available.

C4.3.5. Communication and Telemetry. The DPG has a wide range of test communication and microwave data links (narrow and wide band). Range timing in IRIG "B" code is transmitted, and "A," "E," and "H" can be provided.

C4.3.6. Main Range Areas. DPG ranges can be instrumented to determine velocities, pressures, trajectories, impact functioning, rate of descent, malfunction evaluation, and telemetry of data.

C4.3.6.1. Mortar Range. Facility for firing 4.2-inch, 81-millimeter, and 60-millimeter mortars, each equipped with velocity towers and remote firing equipment.

C4.3.6.2. Howitzer Range. Facility for firing large-caliber weapons.

C4.3.6.3. German Village and Extended Ranges. The primary artillery range consists of three prepared gun positions that will accommodate present Army artillery weapons (self-propelled and towed), smear and tracking camera facilities, firing bunker, ammunition-conditioning chamber pads, radar position and survey instrument observation points for range, and deflection and functioning data.

C4.3.6.4. West Granite Range. This range was developed for firing of chemical projectiles into an impact area that could be contaminated.

C4.4. TYPICAL PROJECTS SUPPORTED

C4.4.1. Projectile, 155-millimeter Smoke (XM-825).

C4.4.2. 8-inch Projectile (XM-736).

C4.4.3. 81-millimeter Smoke Round (XM-819).

C4.4.4. Protective Mask (XM-30).

C4.4.5. Binary Chemical Bomb (BIGEYE).

C4.4.6. Protective Mask (XM-29/30).

C4.4.7. Ground Launched Cruise Missile.

C4.4.8. Projectile, 155-millimeter Binary IVA.

C4.4.9. Jet Exhaust Decontamination System.

C4.5. POINT OF CONTACT

Commander
U.S. Army Dugway Proving Ground
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Dugway, UT 84022
Telephone: AUTOVON: 789-3531
Commercial: 801-522-3531

Figure C4.F1. Artillery/Ballistics Ranges

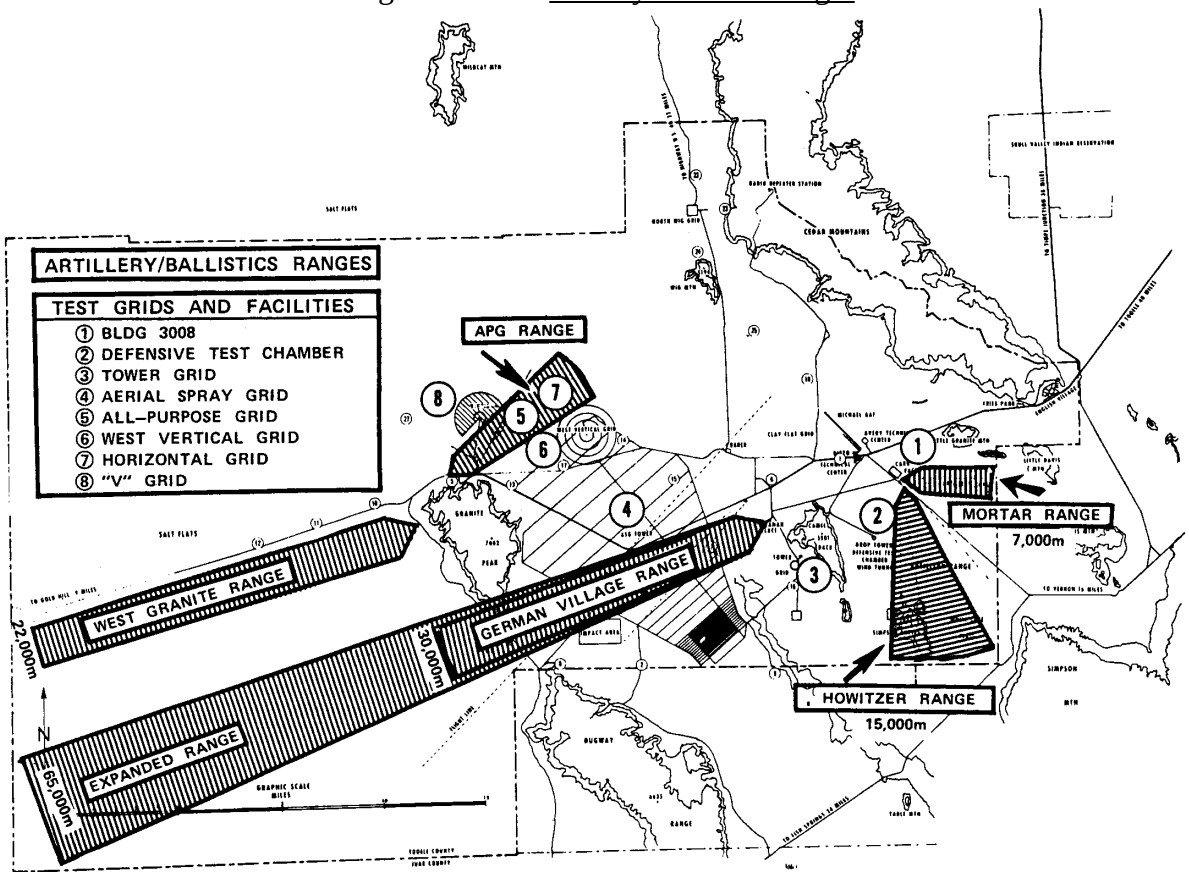
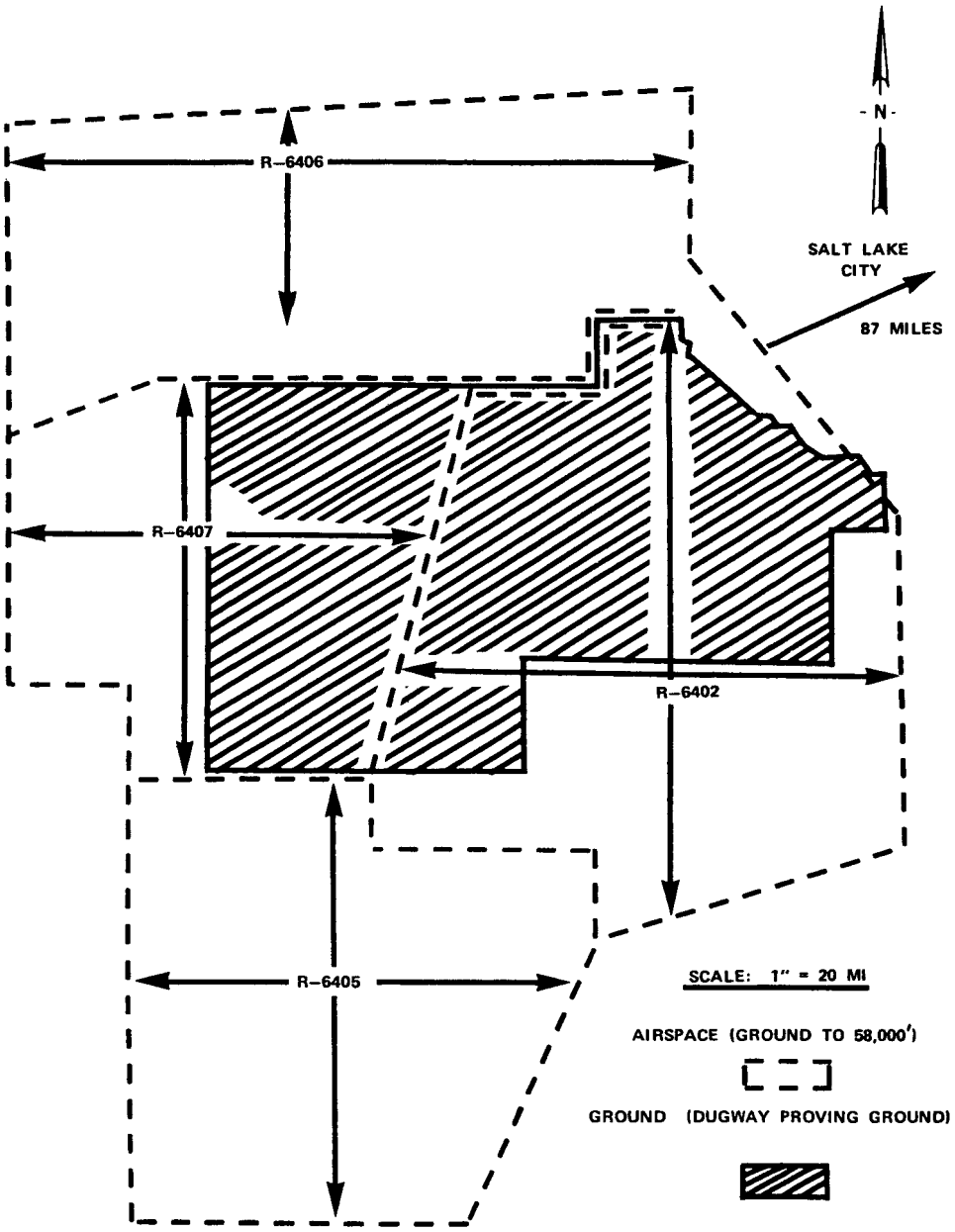


Figure C4.F2. Dugway Proving Ground Airspace and Land Reservation



C5. CHAPTER 5

ELECTRONIC PROVING GROUND

C5.1. MISSION

Testing of all types of Army ground and airborne communications electronics (CE), electronic warfare intelligence (EWI), optical/electro-optical (O/EO), radioactive detection (radiac), identification, electronic detectors, meteorological, surveillance, and communications systems and equipment. Includes environmental testing, electromagnetic compatibility (EMC), and compromising emanations (TEMPEST) and radar detection, resolution, ranging, and tracking of manned and unmanned aircraft. Interoperability testing aspects of complex Command, Control, Communications, and Intelligence (C3I) systems are included.

C5.2. LOCATION

The Electronic Proving Ground (EPG) is a tenant at Fort Huachuca, in southeastern Arizona, 70 miles southeast of Tuscon. Real estate includes more than 70,000 acres on Fort Huachuca, 23,000 acres at Wilcox Dry Lake, and 1.5 million acres near Gila Bend.

C5.3. CAPABILITIES

C5.3.1. Technical Expertise. Expertise in planning, coordinating, conducting, and reporting testing of communications, electronics, and O/EO systems and equipment and radiacs and meteorological systems.

C5.3.2. Restricted Airspace. 1,000 square miles of restricted airspace over instrumented range for tests of CE, navigational, and surveillance systems.

C5.3.3. Electromagnetic Environmental Test Facility. The Army's principal facility where equipment, systems, and concepts are tested and evaluated in a simulated electromagnetic (EM) environment, including electronic countermeasures. The facility includes an automated electromagnetic database, deployment, and analysis capability, the weapon system EM environment simulator, spectrum signature facility, voice scoring facility, voice interference analysis system, and automatic data collection system.

C5.3.4. Communications Test Facility. Provides fixed-plant and field capabilities for testing analog and digital communications equipment and systems under controlled conditions.

C5.3.5. Radar Geometric Fidelity Facility. Has a matrix used to determine the accuracy of area mapping airborne radar systems.

C5.3.6. Infrared and Optical Test Facility. Has capability to perform modulation transfer analysis of O/EO devices.

C5.3.7. Mobile Research, Development, Test, and Evaluation (RDT&E) TEMPEST Test Facility. Used for open field testing of Army tactical CE systems that process or produce classified information for compromising emanations.

C5.3.8. Remotely Piloted Vehicle (RPV) Facility. Provides data instrumentation for the Army's ongoing RPV programs.

C5.3.9. Image Interpretation Facility. Provides image interpretation and analysis for airborne sensor projects, such as combat photographic, infrared, and imaging radar sensors.

C5.3.10. Antenna Pattern Measurement Facility. Consists of a 114-foot nonmetallic tower, which can be used to test electronic equipment or antennas at 25-foot increments from 0 to 100 feet. The facility also includes a 117-foot, sensor-bearing nonmetallic arc (75-foot radius) and turntable capable of determining antenna patterns of various radiating devices in their operating position (such as aircraft in flight).

C5.3.11. Radar Spoke and Radar Resolution Facility. Allows simultaneous measurement of range and azimuth resolution of a test-radar. A moving target simulator track permits controlled and standardized measurement of threshold velocity and radar cross section of radar equipment.

C5.3.12. System Test Facility (STF). Used to control, monitor, and acquire data from test aircraft using the Instrumented Service Range. The STE consists of an operations control center, tracking and surveillance radars, and mobile radar facility for coverage in test areas blocked by the mountain ranges.

C5.3.13. Electronic Support Measures Range and Vulnerability Testing. Maintains 70 accurately surveyed sites in and around Fort Huachuca, Wilcox Dry Lake, and Tucson, Arizona, which can be used as active signal emitter sites or passive receiver

sites allowing accurate measurement of electronic warfare (EW) and signal intelligence systems, direction-finding and location capabilities, or real-world sensitivity. Additionally, specialized equipment (jammers) are available to allow field vulnerability testing of various radar communications and communications, command, and control systems during equipment and system development.

C5.4. TYPICAL PROJECTS SUPPORTED

C5.4.1. All Source Analyses System.

C5.4.2. Artillery-Locating Radar.

C5.4.3. NAVSTAR Global Positioning System.

C5.4.4. Position Location Reporting System (PLRS).

C5.4.5. Steerable Null Antenna Processor (SNAP-1).

C5.4.6. Single Channel Tactical Ground/Airborne Radio Systems (SINCGARS-V).

C5.4.7. Noncommunications Detection System (AN/MSO-103).

C5.4.8. Remotely Monitored Battlefield Sensor System (REMBASS).

C5.4.9. Joint Surveillance Target Attack Radar System.

C5.4.10. Tactical Control and Analysis Center.

C5.5. POINT OF CONTACT

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Fort Huachuca, AZ 86513
Telephone: AUTOVON: 879-6016
Commercial: 602-583-6016

Figure C5.F1. Electronic Proving Ground, Ft. Huachuca Reservation Boundary

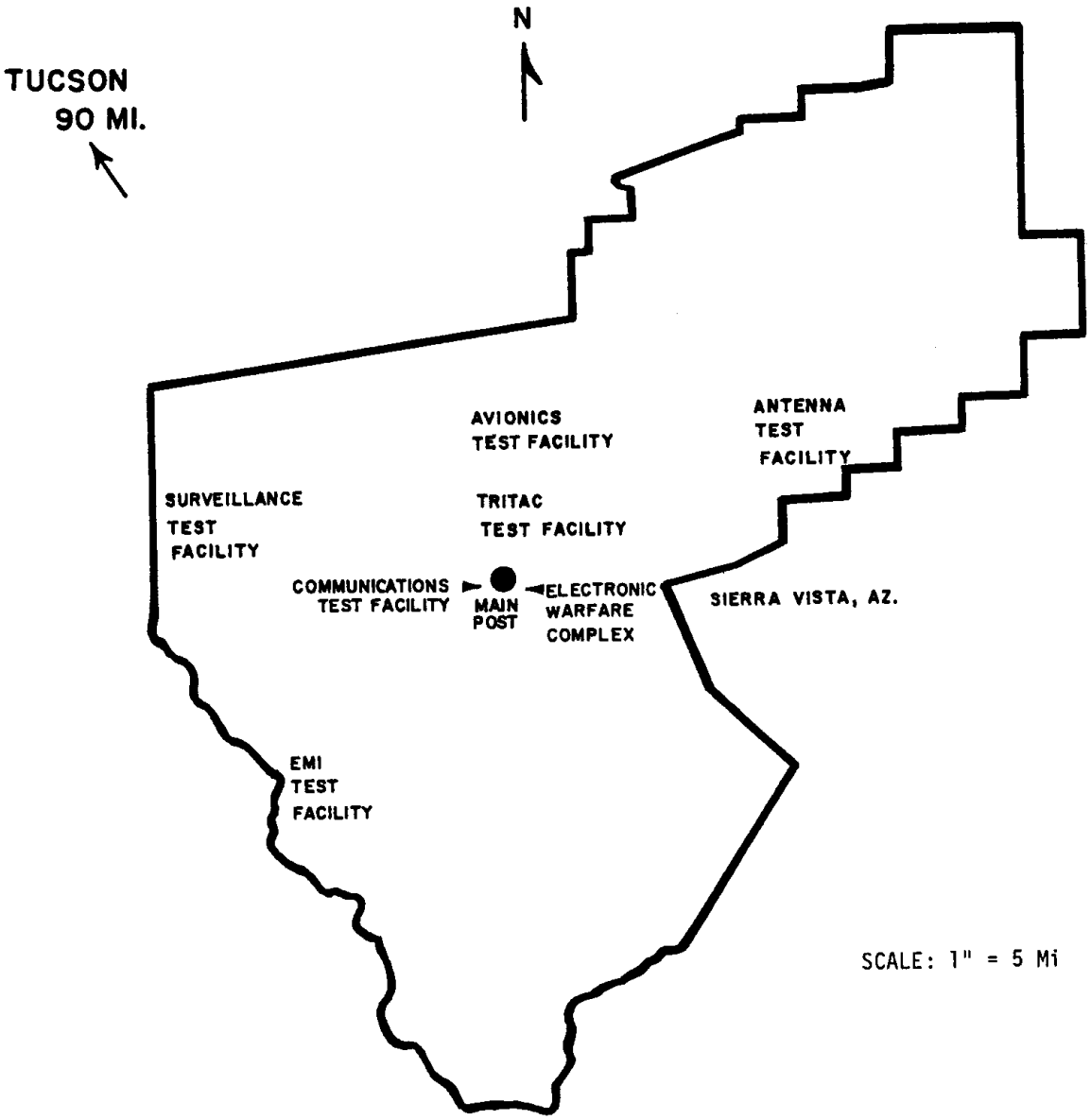
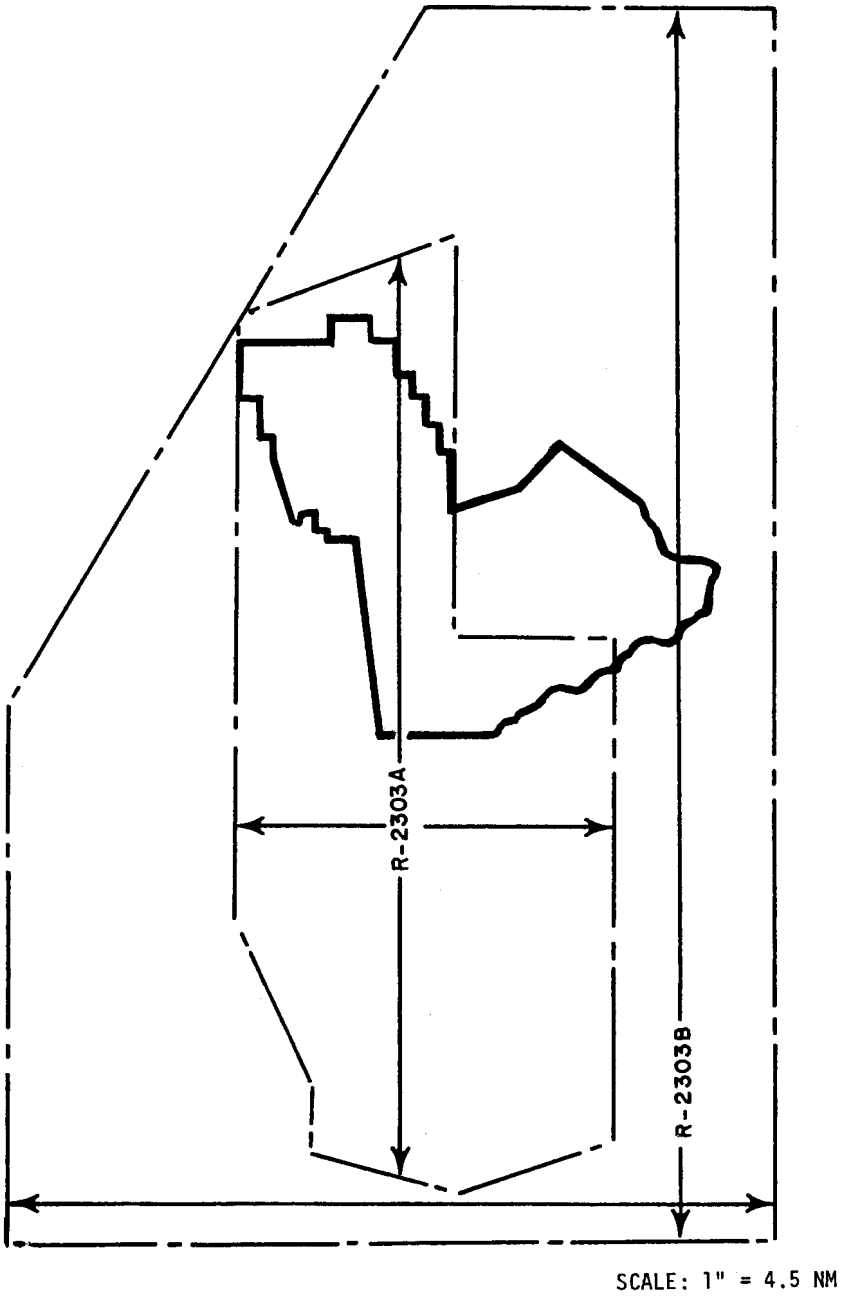


Figure C5.F2. Electronic Proving Ground, Ft. Huachuca Airspace Reservation



C6. CHAPTER 6

ABERDEEN PROVING GROUND

C6.1. MISSION

Plans and conducts developmental and other tests on artillery weapons systems, ammunition, mortars, recoilless rifles, armored vehicles, armor, trucks, materiels-handling equipment, engineer equipment, air conditioners, generators, mines, grenades, pyrotechnics, infantry weapons, small arms ammunition, hospital equipment, bridges, gun air defense systems, fire control equipment, optical equipment, night vision devices, mine detectors, mine-clearing systems, containers, clothing, rations, and Army marine equipment.

C6.2. LOCATION

The Aberdeen Proving Ground (APG) is located on the western shore of the Chesapeake Bay, 30 miles northeast of Baltimore, Maryland.

C6.3. CAPABILITIES

C6.3.1. Available Space. 79,000 acres of land and water for firing and explosive testing and 3,000 acres devoted to automotive system tests. Maximum firing range of 25,000 meters within the reservation and out to 34,000 meters within restricted airspace (land impact and recovery up to 22,500 meters and out to 24,000 meters over controlled water areas). Restricted airspace permits range firings out to 34,000 meters with unlimited altitude.

C6.3.2. Automotive Field Test Facilities. Ten major test areas representing 39 miles of test courses devoted to automotive-type equipment. These test courses, which serve as baseline test courses for other installations, include the following:

C6.3.2.1. Munson Test Course. Gravel roads and specialized courses, including, Belgian block course, frametwister, side slopes of 20 percent to 40 percent, longitudinal slopes of 5 percent to 60 percent, staggered bump course, vertical walls, bridging devices, sine wave course, turning circle, and ditch crossing.

C6.3.2.2. Perryman Test Course. Eight cross-country courses of various degrees of severity used primarily for endurance reliability testing of vehicles.

C6.3.2.3. Churchville Test Area. A series of steep hills with slopes up to 60 percent and winding terrains of gravel and mud.

C6.3.2.4. Other Test Facilities. Include sand mobility course, swimming area, deep water fording area, abrasive mud course, braking test courses, marsh, amphibious ramp, and high-speed road.

C6.3.3. Firing Ranges

C6.3.3.1. Main Front Area. Approximately 28 firing positions, including five barricades and three cold rooms with capability for firing weapons of all calibers, out to approximately 22,000 meters. A full complement of instrumentation is available.

C6.3.3.2. Mulberry Point and Plate Range. Approximately 26 firing positions for testing 40-millimeter to 175-millimeter ammunition. Includes firing over water out to approximately 20,000 meters.

C6.3.3.3. Michaelsville Range. Approximately 26 firing positions for testing small arms up to 40 millimeters.

C6.3.3.4. Armor Test Ranges. Eighteen ranges that permit shooting at armor plate and armored vehicles with all types of weapons. Includes facilities that will contain the dust from depleted uranium projectiles.

C6.3.3.5. Static Detonation Areas. Fifteen positions that permit evaluation of warheads, mines, and demolitions, including blast and fragmentation.

C6.3.3.6. Tank Gunnery Range. Real-time video monitoring and scoring.

C6.3.4. Environmental Test Facilities. Facilities are available for conducting tests such as vibration tests of live ammunition and warheads at high and low temperatures, fungus tests, salt fog tests, humidity tests, solar radiation tests, bounce tests, electromagnetic interference tests (to handle complete weapon systems), rain tests, high and low temperature tests, noise and blast tests, and toxic gas tests.

C6.3.5. Specialized Facilities

C6.3.5.1. Army Pulse Radiation Facility. Provides a radiative environment simulating a portion of the nuclear weapon environment to determine the nuclear vulnerability of Army equipment and systems to satisfy DoD nuclear survivability requirements.

C6.3.5.2. Flash X-Ray. 150-kilovolt to 2.3-megavolt output for radiographs of dynamic objects or events inside gun tubes, in free-flights, or entering, striking, or leaving targets. This is the largest facility of this type within the Test and Evaluation Command.

C6.3.5.3. Live Fire Evasive Target System. Provides simulation of moving targets by projection techniques with automatic video scoring system.

C6.4. TYPICAL PROJECTS SUPPORTED

C6.4.1. Sergeant York Air Defense System.

C6.4.2. Abrams Tank (M-1).

C6.4.3. Improved Light Antitank/Assault Weapon.

C6.4.4. High Mobility Multipurpose Wheeled Vehicle (HMMWV).

C6.4.5. Bradley Fighting Vehicles Systems.

C6.4.6. Heavy Expanded Mobility Tacitcal Truck (HEMTT).

C6.5. POINT OF CONTACT

Commander
U.S. Army Aberdeen Proving Ground
ATTN: STEAP-MT-M
Aberdeen Proving Ground, MD 21005
Telephone: AUTOVON: 283-4639
Commercial: 301-278-4639

Figure C6.F1. Aberdeen Proving Ground, Reservation Boundary

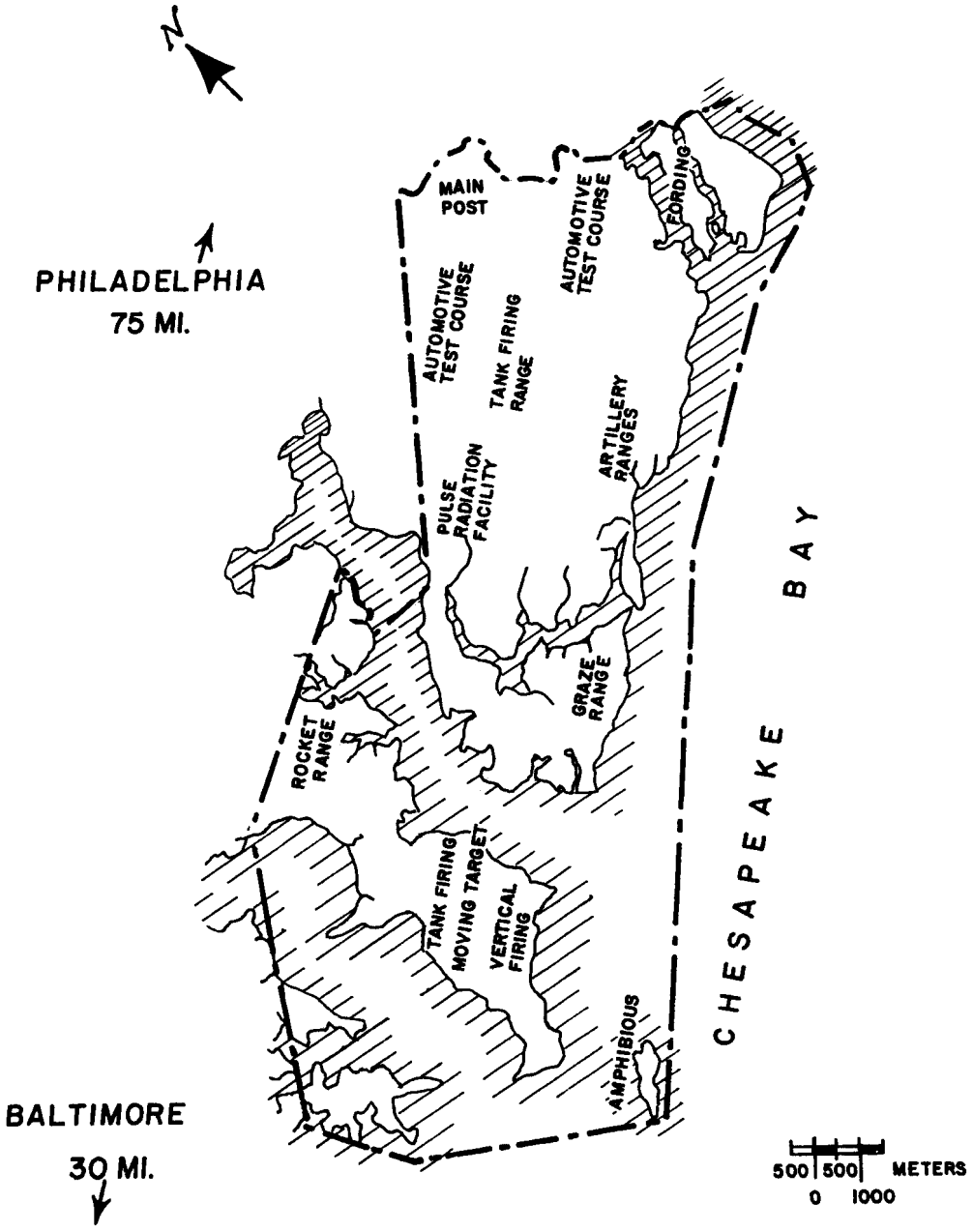
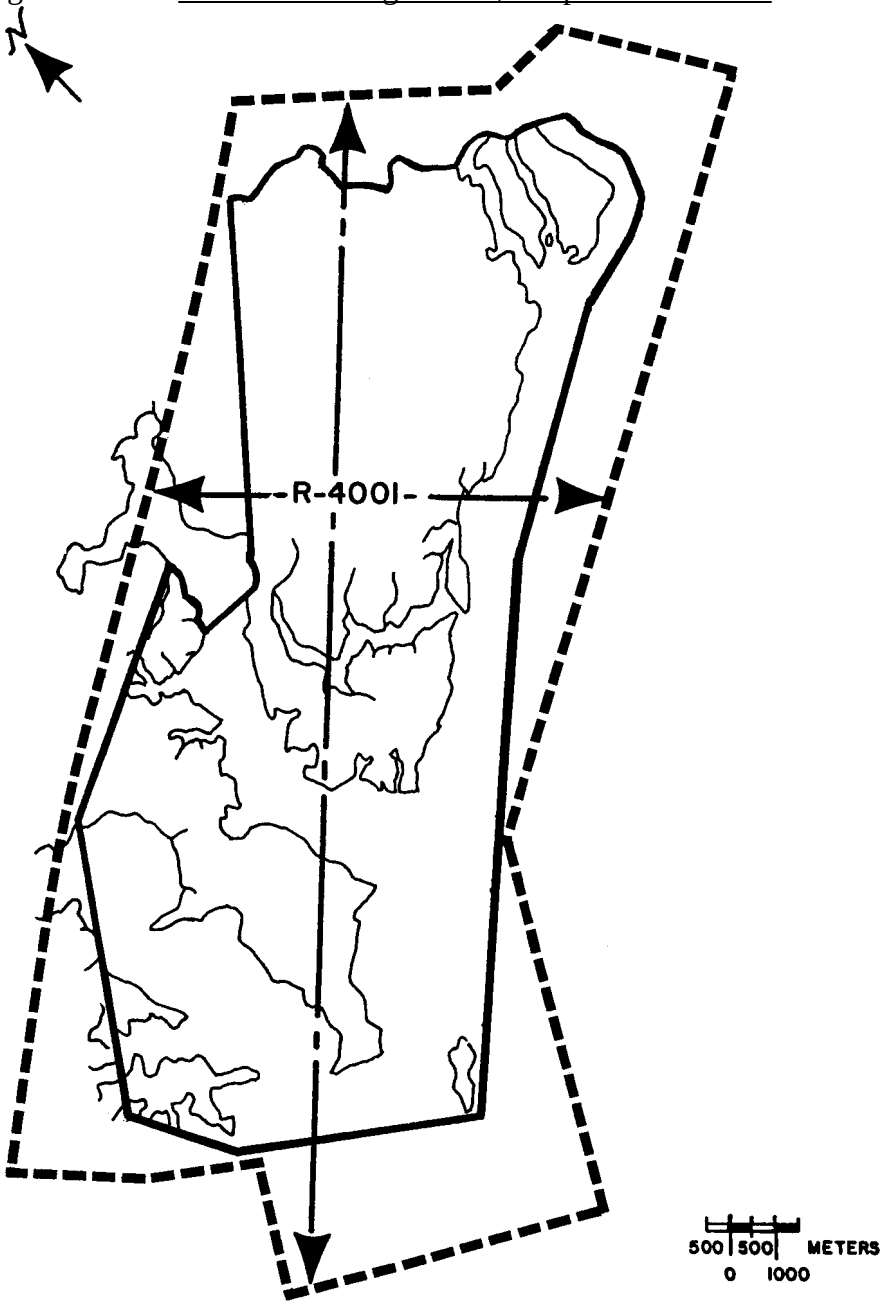


Figure C6.F2. Aberdeen Proving Ground, Airspace Reservation



C7. CHAPTER 7

PACIFIC MISSILE TEST CENTER

C7.1. MISSION

Performs development, test, evaluation, and follow-on engineering, logistics, and training support for naval weapons, weapon systems, and related devices; and provides major range, technical, and base support for Navy RDT&E users, the Fleet, and other DoD and Governmeint Agencies.

C7.2. LOCATION

The Pacific Missile Test Center (PMTC) is located at Point Mugu, California, 60 miles northwest of Los Angeles, California, with a subordinate command, Pacific Missile Range Facility, located at Barking Sands, Kauai, Hawaii.

C7.3. CAPABILITIES

C7.3.1. Sea Test Range. A 32,000 square mile, highly instrumented sea test range off the California coast for multiple air- or surface-launched missile live firings against multiple air or surface targets. Test aircraft and flight test planning and support are provided. The Extended Area Test System (EATS) provides a capability to extend the range capabilities of tracking (60 or more participants), telemetry (10), miss-distance (10), target control, and communications (15) 250 nautical miles or more seaward of San Nicolas Island from Baja, California, to Point Conception, augmenting land-based capabilities. EATS also provides telemetry and impact scoring in the broad ocean area (BOA). Mobile Sea Range capability provides tracking, telemetry, target control, and communications capability for Fleet training in the Pacific, Atlantic, and Mediterranean BOA.

C7.3.2. Underwater Range. A 700 square mile, highly instrumented, three-dimensional underwater tracking range in over 10,000 square miles of sea test range in the Hawaiian area to support multiple air, surface, and submarine anti-air warfare and antisubmarine warfare (ASW) weapons tests against multiple air, surface, or underwater targets. Ambient noise and data system for submarine, as well as ship acoustic signature measurements, are available.

C7.3.3. Targets. Aerial targets available include QF-4, QF-86, AQM-37A, BQM-34 A/S and E/T, BQM/MQM-74C, MQM-8G, and airborne tow targets. Surface targets available include SEPTAR MK-33/35, TRIMARAN, and ex-DD/DE hulk pontoon barge. Infrared and radar augmentation are developed and provided.

C7.3.4. Inland Range. Inland route for cruise missile testing, linking range systems at San Clemente, Point Mugu, Vandenberg Air Force Base (AFB), Edwards AFB, Naval Weapons Center, NASA, Utah Test and Training Range, and Ely, Nevada, using microwave systems and specially equipped aircraft accompanying the missile.

C7.3.5. Reliability Test Labs. Production acceptance test and evaluation for ship- and aircraft-launched weapons systems is performed based on simulated mission profiles, using combined environmental tests with controlled temperature, humidity, rain, snow, salt fog, shock load, acceleration, sea-level to 150,000-foot altitude, and random and sinusoidal vibration capability for reliability and qualification tests. The all-up-round functional and environmental missile test capability is unique.

C7.3.6. Hardware-in-the-Loop Simulation. Weapon systems simulation laboratory provides analog and digital simulation of major weapons systems components with hardware-in-the-loop. System performance is evaluated in a hostile electronic countermeasures (ECM) environment involving actual missile components and computer simulated in-flight dynamics. These data are evaluated for end-game and force-level effectiveness.

C7.3.7. Software Support Activity. Tactical software support is provided to develop, evaluate, and maintain software for integrated tactical offensive and defensive airborne weapons and EW systems both under development and deployed. Environmental and performance software simulations and man-in-the-loop and avionics hardware simulations provide T&E of totally integrated hardware and software subsystems of platform avionics and weapon systems.

C7.3.8. Electronic Warfare. EW laboratories, systems equipment, and aircraft test beds for development, test, and evaluation integration and support of radio frequency (RF), electro-optical (EO), and infrared (IR) warning receivers and countermeasure devices. Laboratories, airborne devices, and simulation equipment are available for the T&E of weapon systems in electromagnetic environments and development of counter-countermeasures.

C7.3.9. Anechoic and Acoustic Facilities. Anechoic and acoustic facilities provide the capability for vulnerability and survivability evaluations of weapon systems

in the areas of radar reflectivity, electro-optic signature, and electromagnetic compatibility.

C7.3.10. Microelectronics Laboratory. Microelectronics laboratory for development, design, prototype fabrication, test, and evaluation of weapons systems instrumentation for flight testing of missiles and aircraft.

C7.4. TYPICAL PROJECTS SUPPORTED

C7.4.1. EA-6B and EW Software Support Activity.

C7.4.2. TOMAHAWK/ALCM/GLCM Cruise Missiles.

C7.4.3. F-14 Weapons Systems Integration.

C7.4.4. Space Shuttle.

C7.4.5. F-18/Missile Integration.

C7.4.6. MINUTEMAN/Space Projects.

C7.4.7. HARPOON/MRASM.

C7.4.8. Airborne Self-Protection Jammer (ASPJ).

C7.4.9. HARM.

C7.4.10. Fleet Training/Tactics Development Air/ASW Surface and Underwater.

C7.4.11. PHOENIX/AIAAM.

C7.4.12. AEGIS/SM-1/SM-2.

C7.4.13. OPEVAL Support (VX-4).

C7.4.14. TRIDENT/Peacekeeper.

C7.5. POINT OF CONTACT

Pacific Missile Test Center
Point Mugu, CA 93042
Code: 0120
Telephone: AUTOVON: 351-8741
Commercial: 805-982-8741

Figure C7.F1. Pacific Missile Test Center, Sea Test Range

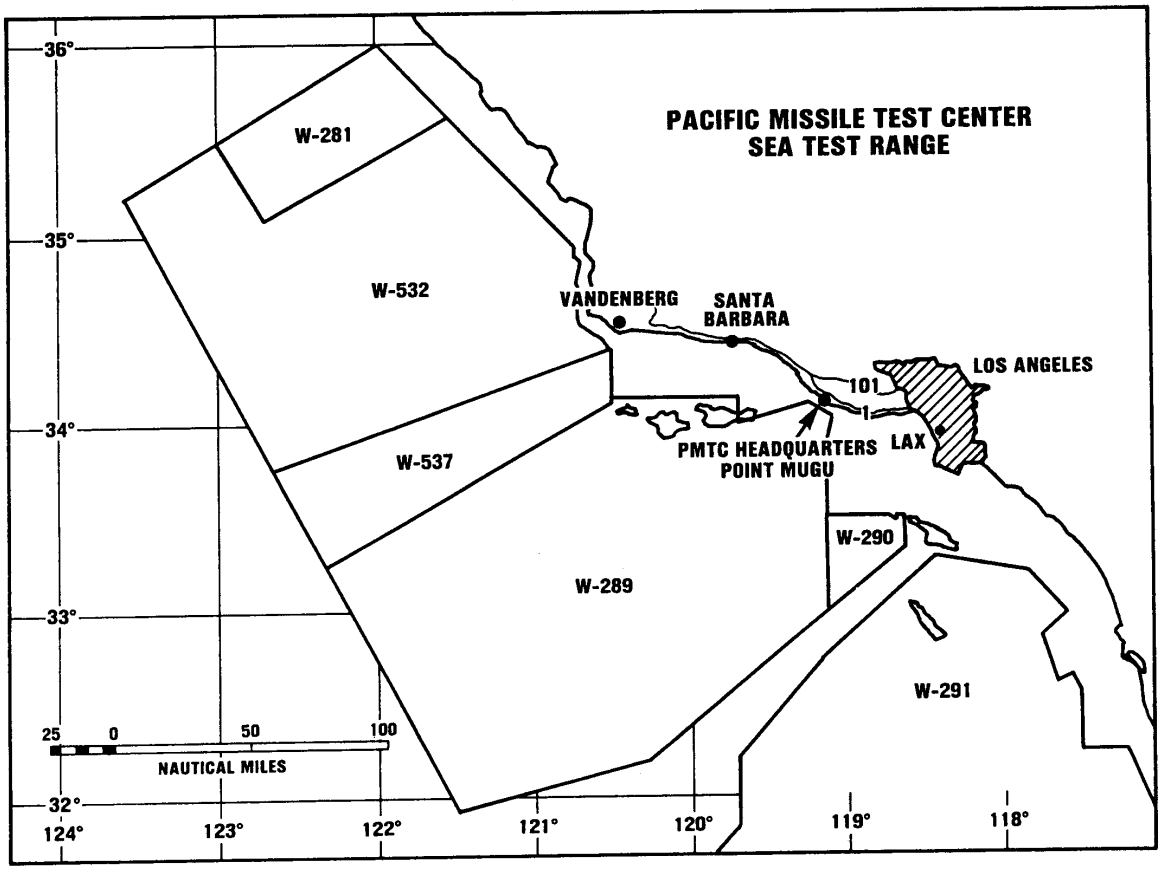
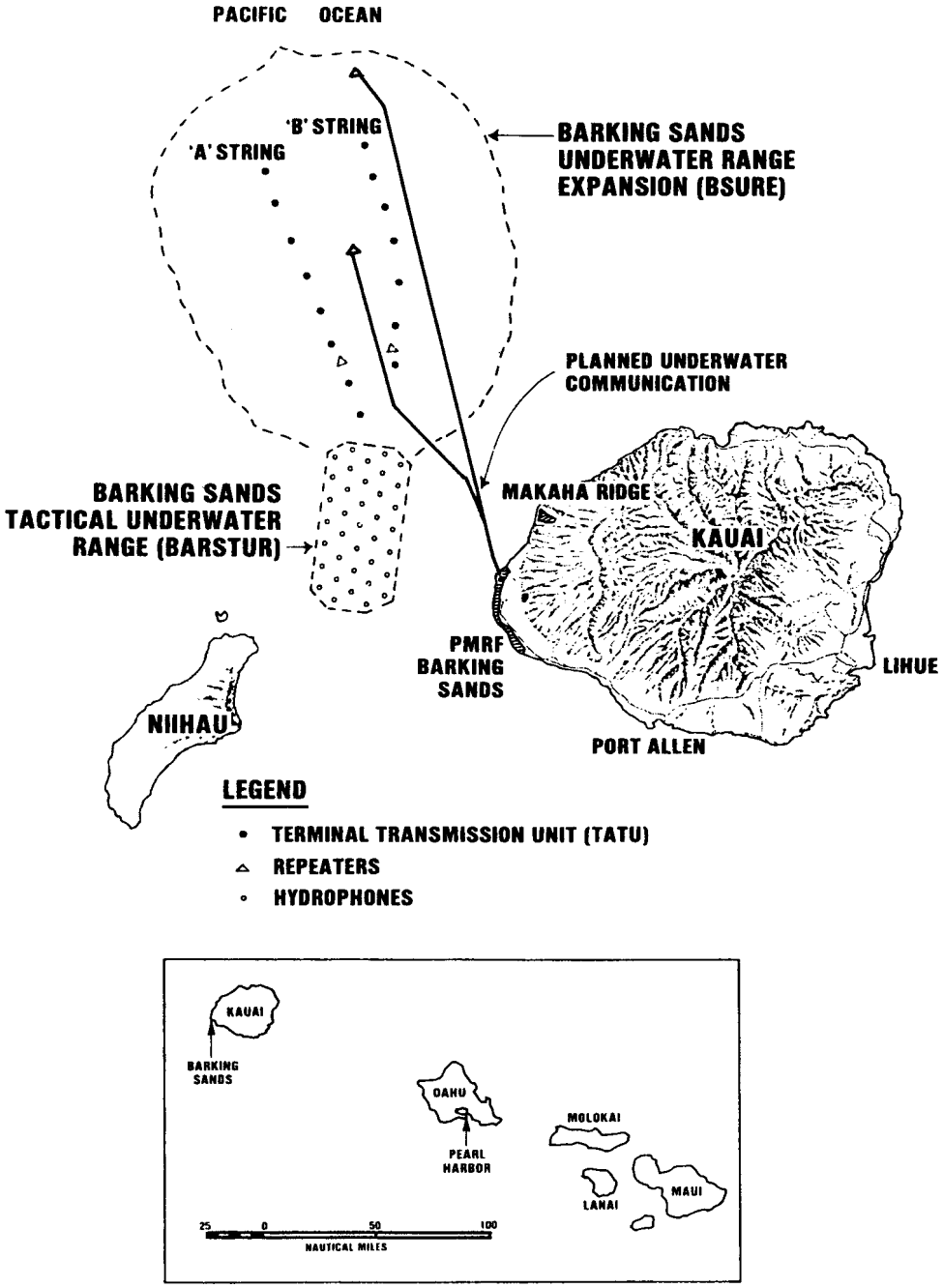


Figure C7.F2. Pacific Missile Range Facility (Barking Sands)



C8. CHAPTER 8

NAVAL AIR TEST CENTER

C8.1. MISSION

Provides technical and engineering support and facilities for the conduct of life-cycle T&E and support of aircraft weapon systems and components for the Department of Defense and other Governmeint Agencies.

C8.2. LOCATION

The Naval Air Test Center (NATC) is in Lexington Park, Maryland, on the Chesapeake Bay, 45 miles southeast of Washington, DC.

C8.3. CAPABILITIES

C8.3.1. NATC Flight Test Facilities. Provide actual and simulated conditions that meet the requirements for all in-Service and planned Naval aircraft weapon system programs. The Naval Air Station is an all-weather landing field. Over 160 aircraft, representing all Navy and Marine Corps aircraft, are supported by RDT&E and Fleet activities. Flight testing is conducted in 50,000 square miles of restricted airspaces over the Chesapeake Bay and offshore operating areas in the Atlantic Ocean. The facilities and capabilities permit Navy and contractor single-site flight and ground testing of aircraft in a sea environment with actual shipboard equipment installations. Included are catapult, takeoff assist, automatic landing aid, arresting gear, and ship-lighting systems for shipboard tactical aircraft. Open sea areas permit ASW system, weapon, and high-Mach testing. The close proximity of Atlantic Fleet units and operating areas facilitates testing of the complete weapon system: ship, aircraft, weapon, and command and control systems.

C8.3.2. Chesapeake Test Range. Provides precise time-space position information in three axes using computer-linked video, theodolite, radar, and laser tracking equipment. This data is merged with telemetry data from the test aircraft to provide real-time data in corrected engineering units for project engineers. Four streams of simultaneous real-time data are available.

C8.3.3. Tactical Avionics Software Test and Evaluation Facility. Uses computers to simulate and stimulate the airborne digital environment, thus developing baseline

engineering data for efficient T&E and optimization of complex weapon systems, flight control systems, and avionic equipments.

C8.3.4. Electromagnetic Environmental Effects Facilities. Provide the capability to fully test electromagnetic interference, compatibility, pulse, radiation hazard, and vulnerability aspects of aircraft weapon systems.

C8.3.5. Aircraft Test and Evaluation Facility. Permits fully instrumented ground tests of an aircraft with the engines operating and all aircraft systems operating using the normal aircraft power.

C8.3.6. Ordnance Facilities. Provide the capability to test weapon and aircraft compatibility including weapon carriage-release, separation, and accuracy.

C8.3.7. Electrical and Electronic Facilities. Provide the capability to test aircraft subsystems and components for vibration, shock, contaminant susceptibility, and operation characteristics in controlled environments.

C8.3.8. Electronic Warfare Facilities. Include an EW Integrated Systems Test Laboratory in which a dense threat environment can be generated and the aircraft systems performance then can be measured against known signal densities. Additionally, range facilities provide precise aircraft antenna and aircraft EW system data on radiation and receive patterns, radar cross section, jam-to-signal ratio, chaff measurements, and warning receiver operation.

C8.3.9. The Acoustic Test Facility. Provides the capability to simulate desired undersea acoustic phenomena and enables baseline tests of ASW systems without the expensive use of at-sea fleet units. Capability also exists to conduct these tests in a realistic C3I environment using ASW Tactical Support Center and ASW operation center assets.

C8.3.10. Carrier Systems Facilities. Include a C-7 steam catapult and an MK-7 arresting gear system, both representative of shipboard installations. These facilities, along with visual and automatic landing aids, are located at the approach end of runway 31, a sea-level site permitting realistic testing in an environment closely representing at-sea conditions. A takeoff assist ramp is used to develop and test short takeoff techniques.

C8.3.11. Test Facility Integration. NATC laboratories and facilities are integrated and can be used either singly or in conjunction with each other by means of a distributed processing cable network.

C8.3.12. U.S. Naval Test Pilot School. Provides training to experienced pilots and flight officers in the theory and techniques of flight testing aircraft and airborne systems.

C8.4. TYPICAL PROJECTS SUPPORTED

C8.4.1. Aircraft Mission System T&E:

C8.4.1.1. System Performance and Integration.

C8.4.1.2. Technical Performance.

C8.4.1.3. Mission Effectiveness.

C8.4.1.4. Human Factors and Safety.

C8.4.2. Aircraft Mission Equipment T&E:

C8.4.2.1. Sensors.

C8.4.2.2. Data Processors and Software.

C8.4.2.3. EW Hardware and Software.

C8.4.2.4. Fire Control Systems.

C8.4.3. Aircraft Systems and Component T&E (Airframe, Propulsion Flight Control).

C8.4.4. Aircraft Flight Characteristics:

C8.4.4.1. Flying Qualities and Performance.

C8.4.4.2. Carrier and Ship Interface.

C8.4.4.3. Weapon and Store Compatibility.

C8.4.4.4. Weapon Separation Envelopes.

C8.4.5. Aircraft Maintenance and Logistics.

C8.4.6. Contractor Development Programs.

C8.5. POINT OF CONTACT

Naval Air Test Center
Patuxent River, MD 20670
Code: CT25
Telephone: AUTOVON: 356-4582
Commercial: 301-863-4582

Figure C8.F1. Naval Air Test Center, Patuxent River, MD

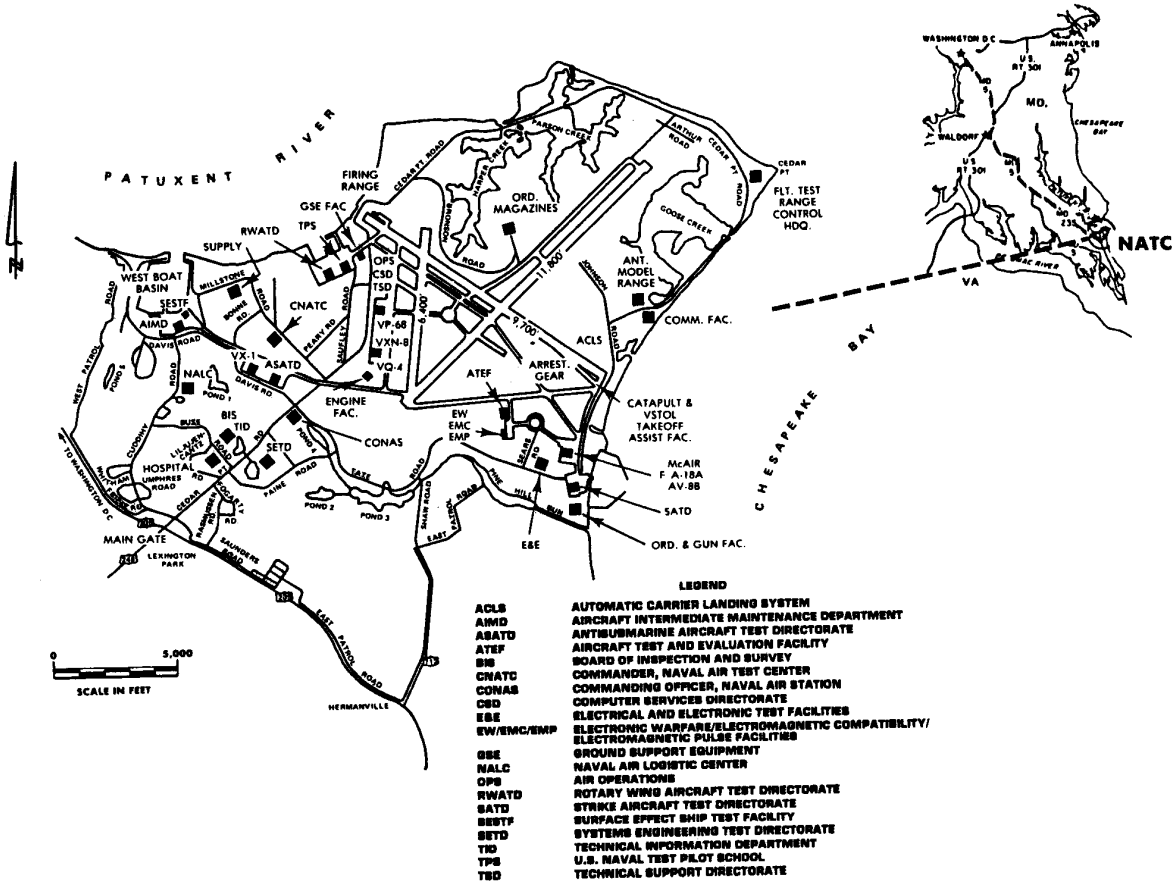
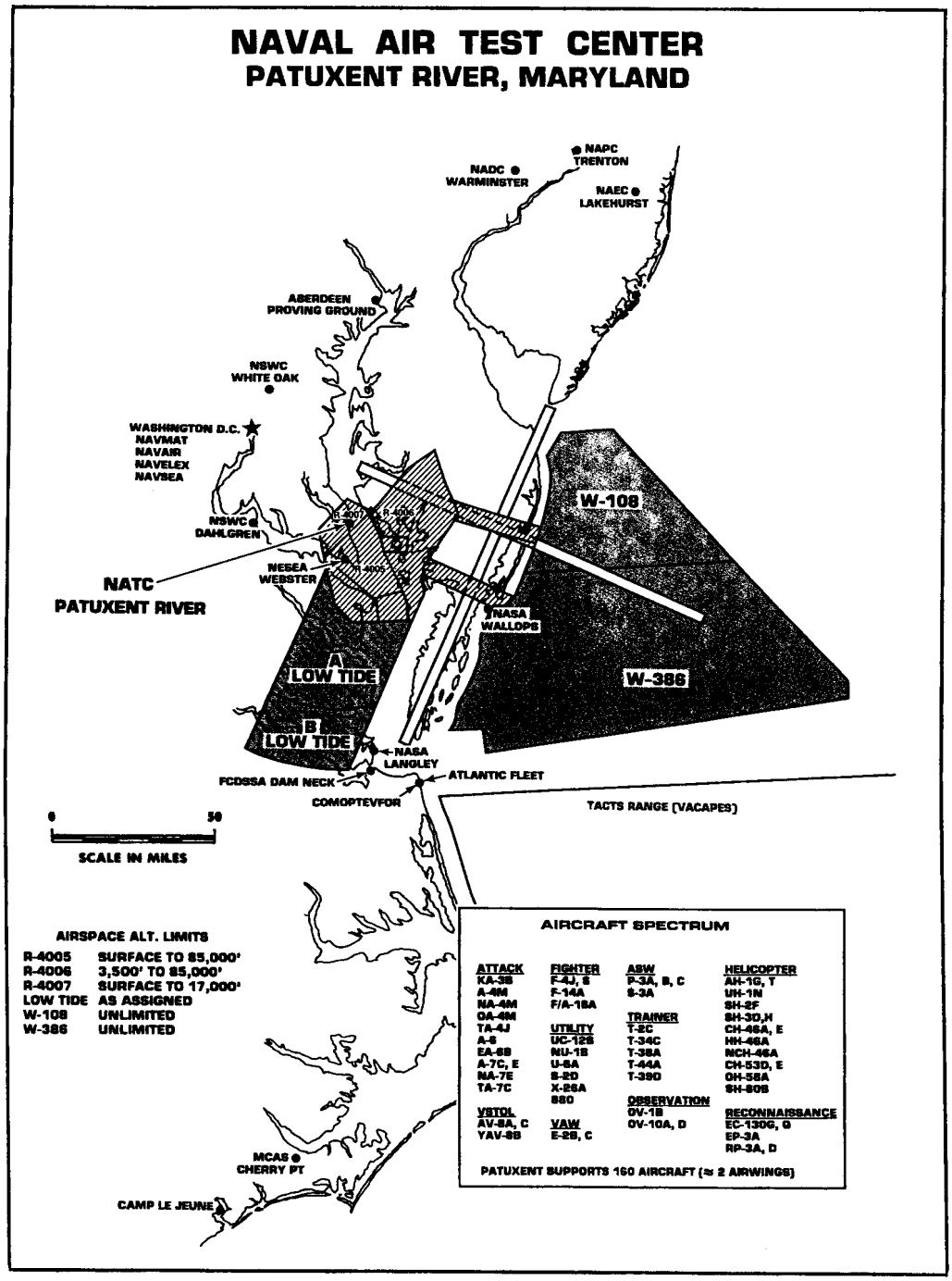


Figure C8.F2. Naval Air Test Center, Patuxent River, MD



C9. CHAPTER 9

NAVAL WEAPONS CENTER

C9.1. MISSION

The Test and Evaluation Directorate, which is responsible for the ranges at the Naval Weapons Center (NWC), conducts test and evaluation of air- and surface-launched weapons, EW systems, missiles, life-support systems, and parachute systems.

C9.2. LOCATION

The NWC, China Lake, California, is located in the upper Mojave Desert, 150 miles northeast of Los Angeles.

C9.3. CAPABILITIES

C9.3.1. Air Operation Ranges include the Air Weapons Range, Air Tactics Range, and Military Target Range. The Air Weapons Range is primarily for the test and evaluation of fire-control and bombing systems, guided weapons, air-to-surface missiles, and unguided bombs against fixed and moving ground targets. The Air Tactics Range provides for development and evaluation of air-to-surface attack tactics and weapon-delivery techniques and for training of Fleet pilots in the use of weapons and tactics. The Military Target Range affords pilots the opportunity to train in weapons delivery against such targets as bridges, tunnels, tanks, convoys, surface-to-air sites, and gun emplacements.

C9.3.2. Guided Missile Ranges are used for test and evaluation of air- and surface-launched missiles, guns, fire-control systems, field evaluations of small tactical air-defense systems, and test activities involving potential hazards from experimental and unproven ordnance or from damaged target drones. These ranges also have vertical launch capability.

C9.3.3. Supersonic Test Tracks are heavily instrumented and provide for tests requiring very high speeds, heavy carriages, long-duration runs, and controlled deceleration.

C9.3.4. Explosive Test Ranges provide testing of explosives (including rocket motors, warheads, and fuel-air explosive systems) using instrumented, isolated sites.

C9.3.5. Propulsion Test Ranges are capable of static tests of solid and liquid rocket motors and of air-breathing systems.

C9.3.6. Live Ordnance Environmental Test Facilities test ordnance in all stockpile-to-target environments, such as vibration, shock, temperature, humidity, salt spray, and jet fuel fire.

C9.3.7. The Electronic Warfare Threat Environment Simulation (EWTES) Facility provides enemy threat systems in a simulated electronic environment. Dedicated to the T&E of ECM systems and EW tactics development.

C9.3.8. Major Instrumentation

C9.3.8.1. Trajectory Measurement Systems include nine digitized, high-accuracy radars, a fixed-line theodolite array of up to 40 locations supplemented with 6 mobile systems, 20 precision Bowen (synchro-ballistic) strip cameras, various metric video special purpose systems for impact scoring, and miss-distance applications.

C9.3.8.2. Telemetry Systems include four fixed-data acquisition stations replete with complete receiving, recording, demodulating, de-multiplexing and display for all types of IRIG telemetry formats, and airborne video.

C9.3.8.3. Special Optics provide a wide variety of specialized cameras, such as tracking cameras (with up to 200-inch focal-length lenses) and fixed high-speed film and video cameras that support tests at all ranges and facilities. Other special optical systems include a mobile van for measuring laser spot characteristics and video systems for determining cluster weapon patterns and projectile fuzing.

C9.3.8.4. Support Systems include ultra-high frequency (UHF) and very-high frequency (VHF), broad band cable, microwave communications, central IRIG timing, frequency monitoring, meteorological facilities, and a surveillance radar system for R-2508 Airspace.

C9.3.8.5. Specific Range and Facility Systems include instrumentation unique to their individual functions. Examples are environment simulation and fuze targeting systems at the research track, dynamic X-ray capability for propulsion testing, and combined environmental conditioning for live ordnance tests. Full-scale RPV (drones), Integrated Target Control System, and missile and drone flight termination systems support tactical missile testing.

C9.3.9. Parachute Test Facilities include the NWC drop zone, the water and land drop zones, and the Whirl Tower at El Centro, California.

C9.4. TYPICAL PROJECTS SUPPORTED

C9.4.1. TRIDENT

C9.4.2. Parachute Systems

C9.4.3. SKIPPER

C9.4.4. SIDEWINDER

C9.4.5. Aircrew Systems

C9.4.6. GATOR MINES

C9.4.7. SPARROW

C9.4.8. All Navy Conventional Ordnance

C9.4.9. F-16 INTEGRATION

C9.4.10. HARM

C9.4.11. POSEIDON

C9.4.12. CHAPARRAL

C9.4.13. SEAWARS

C9.4.14. POLARIS

C9.4.15. FAE-II

C9.4.16. WALLEYE

C9.4.17. ESCAPAC

C9.4.18. SIDEARM

C9.4.19. CRUISE MISSILES

C9.4.20. A-6 TRAM

C9.4.21. PHALANX

C9.4.22. F/A-18

C9.4.23. A-7

C9.4.24. MAVERICK

C9.4.25. HARPOON

C9.4.26. ARBS

C9.4.27. ROLAND

C9.5. POINT OF CONTACT

Naval Weapons Center
Test and Evaluation Directorate
China Lake, CA 93555
Code: 061
Telephone: AUTOVON: 437-3145
Commercial: 714-939-3145

Figure C9.F1. Naval Weapons Center Ranges and Land Use

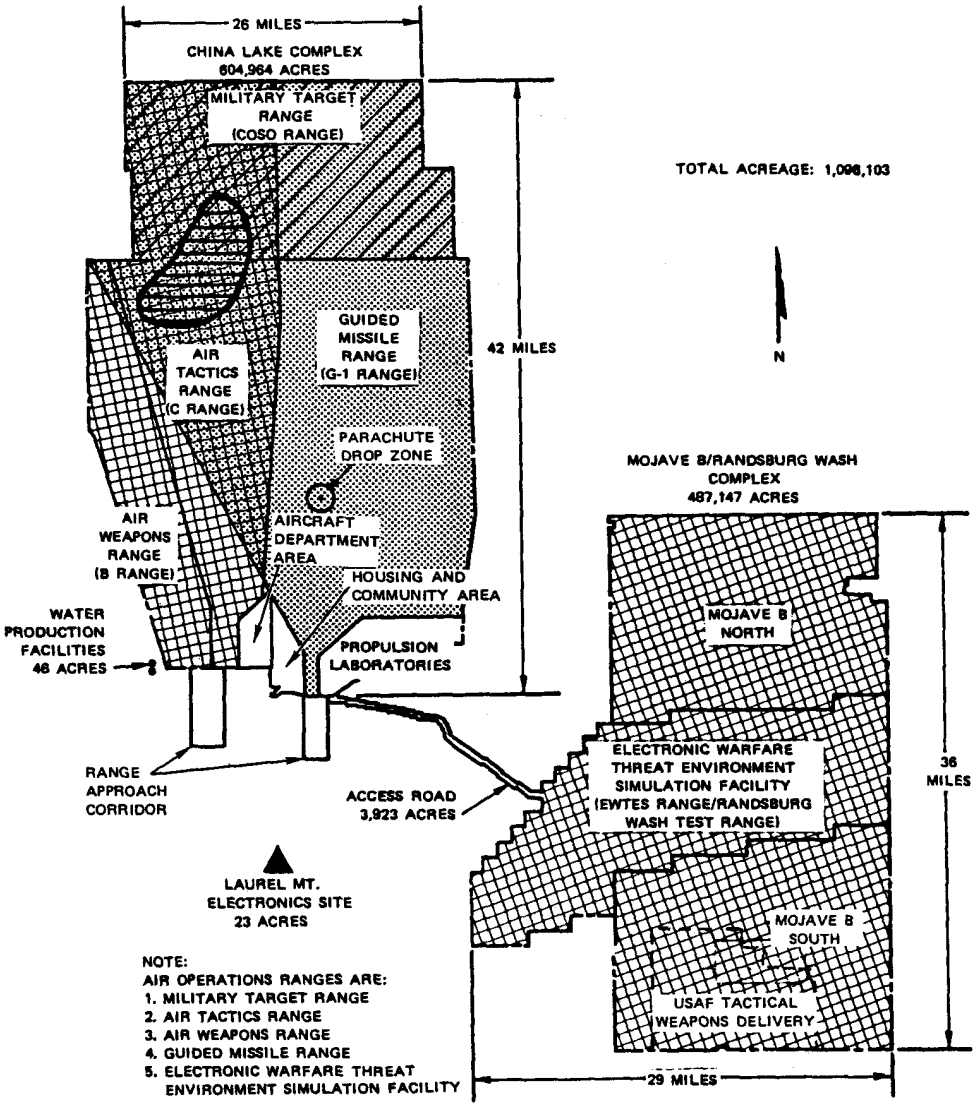
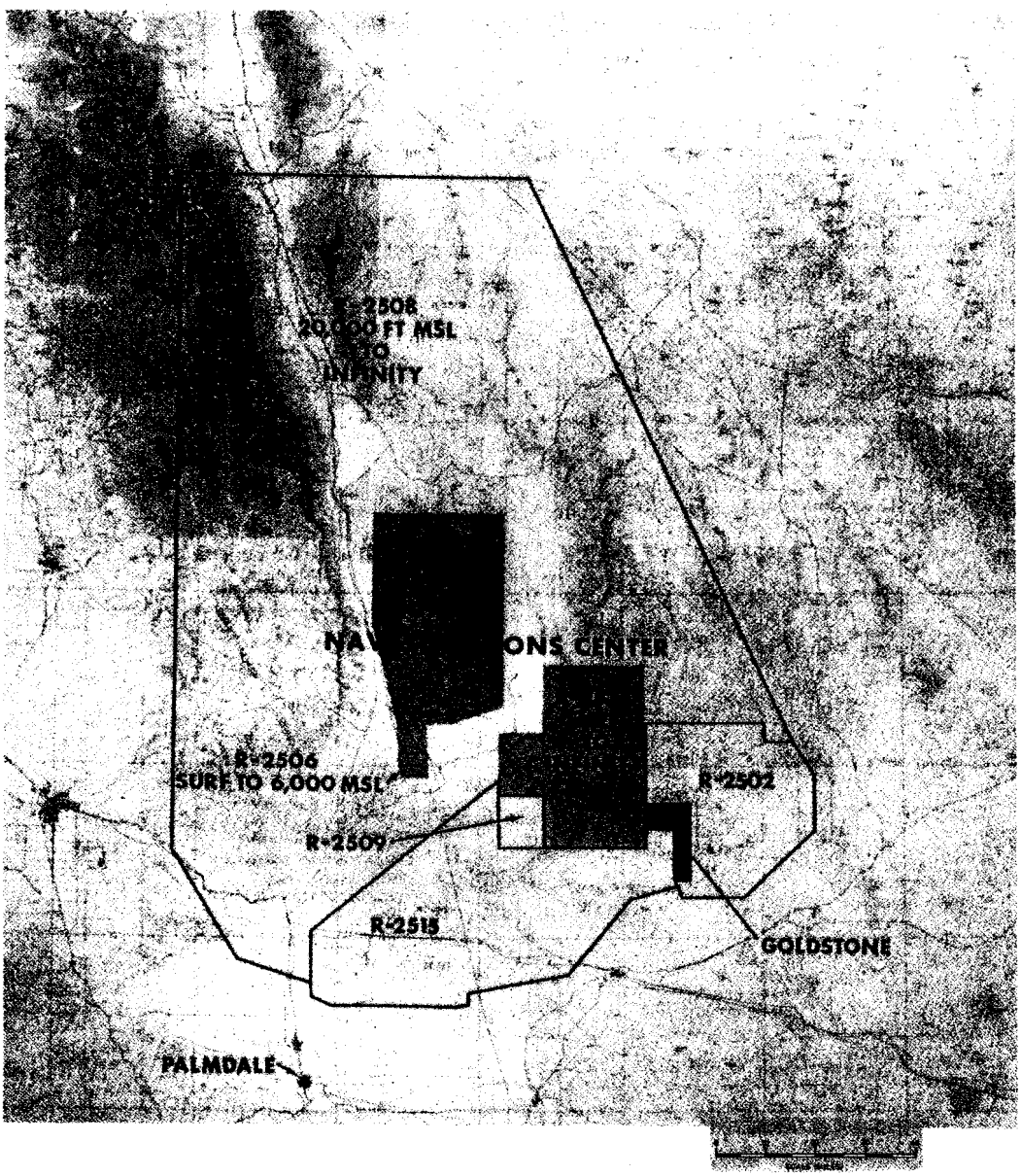


Figure C9.F2. R2508 Complex



C10. CHAPTER 10

NAVAL AIR PROPULSION CENTER

C10.1. MISSION

Provides complete technical and engineering support for air-breathing propulsion systems, including their accessories, components, fuels, and lubricants, to the Naval Air Systems Command and the Fleet by managing and performing applied RDT&E.

C10.2. LOCATION

Trenton, New Jersey.

C10.3. CAPABILITIES

C10.3.1. The Naval Air Propulsion Center (NAPC) engine test plant facilities can provide simulated test conditions that meet the requirements for all present and planned Navy aircraft engines.

C10.3.1.1. The overall conditions that can be simulated are as follows:

C10.3.1.1.1. Altitude: Sea level to 100,000 feet.

C10.3.1.1.2. Flight Speed: 0 to Mach 3.0.

C10.3.1.1.3. Temperatures: -65°F to 650°F.

C10.3.1.1.4. Airflow: 0 to 700 pounds per second.

C10.3.1.2. Large engines (turbojet and turbofan) are tested in three altitude test cells and two sea-level test cells. Small engines (turboprop and turboshaft) are tested in four small sea-level and altitude test cells. Tests are run under simulated operating conditions to verify performance, determine deficiencies, develop corrections to design or service problems, and define operational limitations. All the cells use the same ram air facility, refrigeration systems, and vacuum exhausters and have quick-response inlet and exhaust control valves, fuel temperature conditioners, and real-time data acquisition and processing systems.

C10.3.2. The Auxiliary Test Area is used to test ram air turbines and air-breathing engine components under simulated operational conditions to verify performance, determine deficiencies, develop corrections to design or service problems, and define operational limitations. The major equipment used includes the ram air facility, refrigeration systems, vacuum exhausters, and a real-time data acquisition and processing system.

C10.3.3. The Transmission Test Facility is used to develop, qualify, and evaluate the reliability of complete helicopter drive systems under simulated mission operation and to identify and evaluate system-related interface problems. The major equipment used includes an 8,000-horsepower step-up gear box, water brakes, and thrust and bending loading systems.

C10.3.4. The Accessory Test Area is used to test auxiliary systems and accessories under simulated operational conditions to verify performance, determine deficiencies, develop corrections to design or service problems, and define operational constraints. The major equipment used includes a high-pressure air compressor, an air heater, motor-generator dynamometers, a variable attitude stand, a burner test rig, a vibration machine, and high and low temperature control fluid systems.

C10.3.5. The Rotor Spin Facility provides experimental support for R&D and evaluation programs that pertain to rotor structural integrity, durability, and burst protection. In this facility, under simulated engine conditions, inexpensive and expeditious component testing is conducted to evaluate, develop, and optimize rotor designs. The major equipment used includes spin chambers, high-speed photographic equipment, induction and radiant heaters, nondestructive inspection equipment, optical temperature-measuring system, turbine drive systems, and real-time data acquisition and processing systems.

C10.3.6. The Outdoor Test Site is used to test propulsion systems under gyroscopic loading conditions to simulate the loads imposed by flight maneuvers and to conduct noise tests, infrared signature tests, and engine performance tests in the absence of test cell wall effects. The major equipment used includes the turntable test stand, the gyroscopic test rig, and real-time data acquisition and processing systems.

C10.3.7. The Fuels and Lubricants Laboratory is used to support development of propulsion system fuels and lubricants, preparation of specifications, and solution of service problems, and to conduct fluid systems investigations, measure air pollution, and determine life- and load-bearing characteristics of gear and bearing materials. This laboratory uses a chemical laboratory, a Fluid Systems Test Facility with variable and

other drives and hybrid computer, an infrared spectrophotometer, a gas chromatograph, an atomic absorption spectrophotometer, fuel thermal stability cokers, a single element Coalescer Test Facility, a high temperature-bearing test rig, Ryder gear machines, bearing and gear fatigue equipment, an analytical ferrograph, and a pollutant-measuring console.

C10.4. TYPICAL PROJECTS SUPPORTED

C10.4.1. Engine Performance.

C10.4.2. Inlet Distortion.

C10.4.3. Simulated Mission Endurance Test.

C10.4.4. Water and Sand Ingestion, Icing, and Humidity Effects.

C10.4.5. Service Problem Investigation.

C10.4.6. Rocket Exhaust Gas Ingestion Corrosion Effects.

C10.4.7. Rotor Component Development Program.

C10.4.8. Rotor Burst Containment.

C10.4.9. Develop and Qualify New Fuels, Lubricants, and Additives.

C10.4.10. Evaluate New Gear and Bearing Material.

C10.4.11. Gyroscopic Loading.

C10.4.12. Helicopter Transmission Testing.

C10.4.13. Fluid Systems Component Testing.

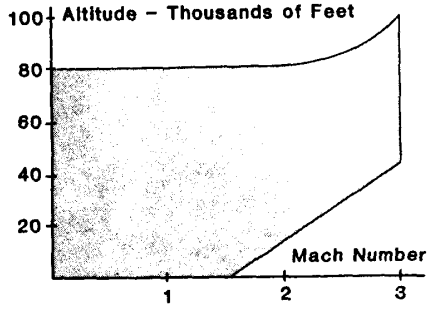
C10.4.14. Engine Exhaust Infrared Suppression and Signature Measurement.

C10.4.15. Low-Cycle Fatigue.

C10.5. POINT OF CONTACT

Naval Air Propulsion Center
Trenton, NJ 08628
Code: RMI
Telephone: AUTOVON: 443-7652
Commercial: 609-896-5652

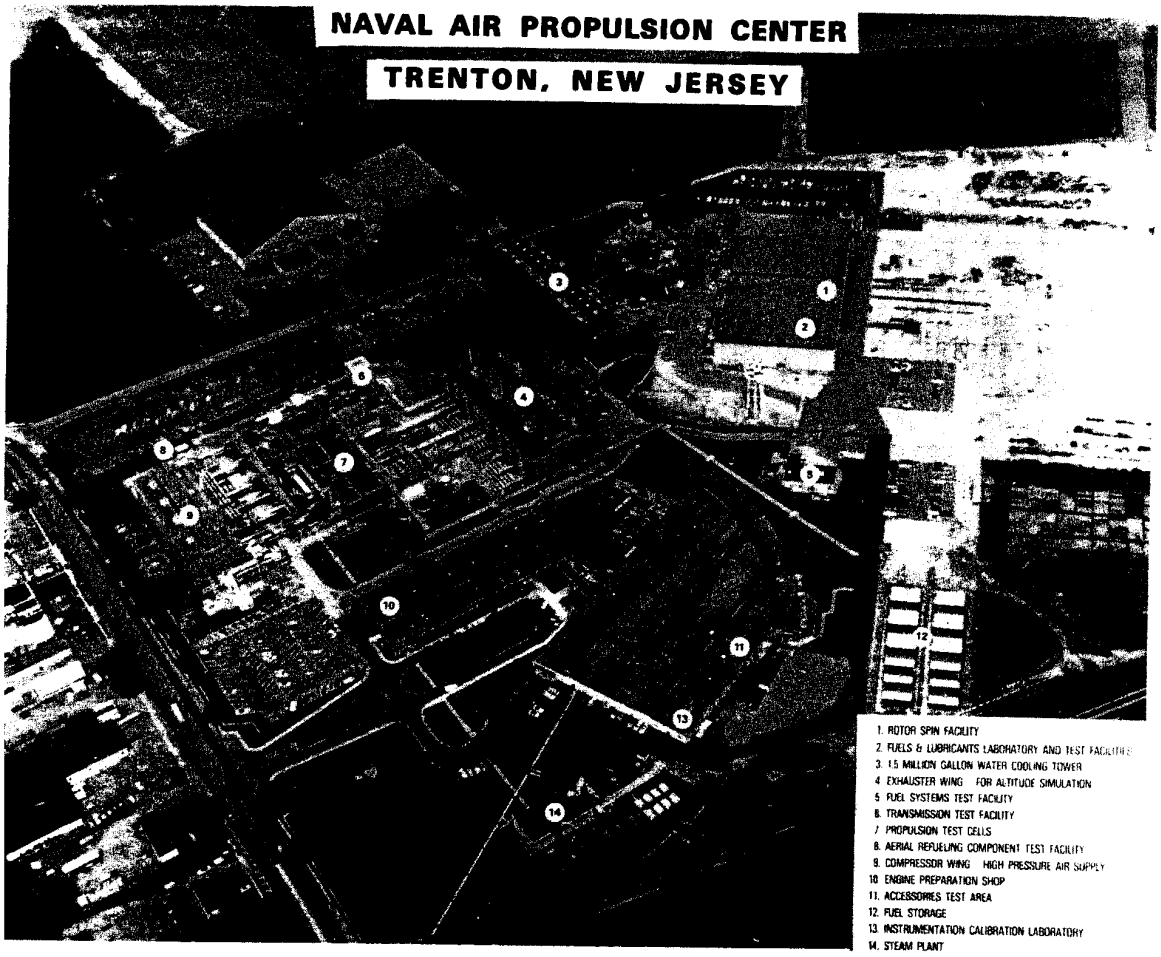
Figure C10.F1. NAPC Facility Capability



SUMMARY OF TEST CELL CAPABILITIES

CONDITIONS		3E	2E	1E	1W	2W	3W	4W	5W	6W
Airflow (lb./sec.)		700	430	430	350	350	100	100	100	100
Inlet Temp. (°F)	Cold	-65	-65	-65	-65	-65	-65	-65	-65	-65
	Hot	+650	+390	+390	+220	+220	+220	+220	+220	+220
Mach Number		3.0	2.4	2.4	1.1	1.1	1.1	1.1	1.1	1.1
Altitude (ft)		100,000	80,000	80,000	S.L.	S.L.	80,000	80,000	80,000	80,000
Test Area	Length (ft)	30	18	18	56	56	15	20	17	17
	Width/Diam. (ft)	17	14.5	14.5	23	23	8	10	10	10
	Height (ft)	—	—	—	14	14	8	—	10	10

Figure C10.F2. Naval Air Propulsion Center, Trenton, New Jersey



C11. CHAPTER 11

ATLANTIC UNDERSEA TEST AND EVALUATION CENTER

C11.1. MISSION

Provides, develops, and operates the deep-water facility for underwater acoustic measurements and testing and calibrating sonars and provides tracking data on ships, submarines, aircraft, and weapons systems to support Navy ASW and undersea R&D programs, assessment, and operational readiness.

C11.2. LOCATION

The Atlantic Undersea Test and Evaluation Center (AUTEC) is a detachment of the Naval Underwater Systems Center at Newport, Rhode Island. This center is located on Andros Island, Bahamas, with the ranges located in the Tongue of the Ocean, a sheltered, deep (800 fathoms), quiet body of water.

C11.3. CAPABILITIES

C11.3.1. The AUTEC Weapons Range, a tracking range for ASW system assessments, is capable of providing measurements between subsurface, surface, and air targets for use in evaluating sensors, weapons systems, and platforms as well as simulating or stimulating sensors, weapons, and targets. It occupies an area 5 miles wide and 35 miles long with a water depth of 5,000 feet and is supported by five down-range sites up to 50 miles from Main Base.

C11.3.2. The Acoustic Measurement Range is the only permanent underwater noise-measuring facility on the east coast. The range is used to detect, record, and analyze hydroacoustic noise generated by submarines and surface ships in at-sea conditions. The quiet ambient background is due to sheltered waters, low traffic noise, and restricted area. This allows surface and submarine acoustic programs in support of acoustic silencing, target strength, vulnerability and counterdetectability, and sensor performance programs to be conducted. Signal measurement is accomplished through a moored stable underwater array, cabled to a real-time, shore-based data processing system.

C11.3.3. The Fleet Operational Readiness Accuracy Check Site (FORACS V) measures the accuracy of ASW and navigational sensors installed in surface ships,

submarines, and helicopters. Measurements provide the repeatable accuracy of shipboard equipment and statistical data for analysis of overall system performance. Sensors tested include sonars, search radars, gun fire control radars, EW slipport measures (ESM) equipment, gyro compasses, Stellar Inertial Navigation System, periscopes, and peloruses.

C11.3.4. The Naval Underwater Systems Center, Headquarters, Newport, Rhode Island, is the scheduling and operating area assignment authority for the Tongue-of-the-Ocean Operating Areas for the Commander in Chief, U.S. Atlantic Fleet.

C11.3.5. The Main Base on Andros Island is the center for all on range operations. The Command Control building houses the range control, data acquisition, and data processing equipment for all three ranges. The range support shop provides all onsite facilities.

C11.3.6. Air and Surface Craft includes the range ship IX 306 and the major torpedo launch platform (with both surface and submerged launching capability); a 100-foot torpedo recovery craft; YFU 97 and YFU 91 Logistics Support Craft and six other small boats for logistics and personnel transfer; a UH-1N helicopter and two SH-3G helicopters (for torpedo and torpedo-target recovery); and a cargo aircraft for regularly scheduled passenger and cargo transport between Andros Island and West Palm Beach, Florida.

C11.4. TYPICAL PROJECTS SUPPORTED

C11.4.1. FFG 7 Development and Post Delivery Acceptance.

C11.4.2. Torpedo Mk 48 Advanced Capability (ADCAP).

C11.4.3. Trident Certification.

C11.4.4. SSN 688/700 Certification.

C11.4.5. Airborne ASW Developments - P-3C Update.

C11.4.6. LAMPS Mk III.

C11.4.7. Fleet Ballistic Missile Submarine (SSBN) Security Technology.

C11.4.8. Submarine and Surface Ship Silencing Program.

C11.4.9. Torpedo Mk 48 Training Certification and Proficiency Firing.

C11.4.10. New Ship Class Standardization.

C11.4.11. S-3A.

C11.4.12. Mobile Submarine Simulator.

C11.4.13. Harpoon Targeting Trials.

C11.4.14. Acoustic Signature Tests AN/BQQ-5 Sonar.

C11.4.15. SSBN Improved Sonar Processing Equipment.

C11.5. POINT OF CONTACT

Naval Underwater Systems Center
Atlantic Undersea Test and Evaluation Center
Newport, RI 02840
Code: 389
Telephone: AUTOVON: 948-4269
Commercial: 401-841-4269

Figure C11.F1. Atlantic Undersea Test and Evaluation Center Locations

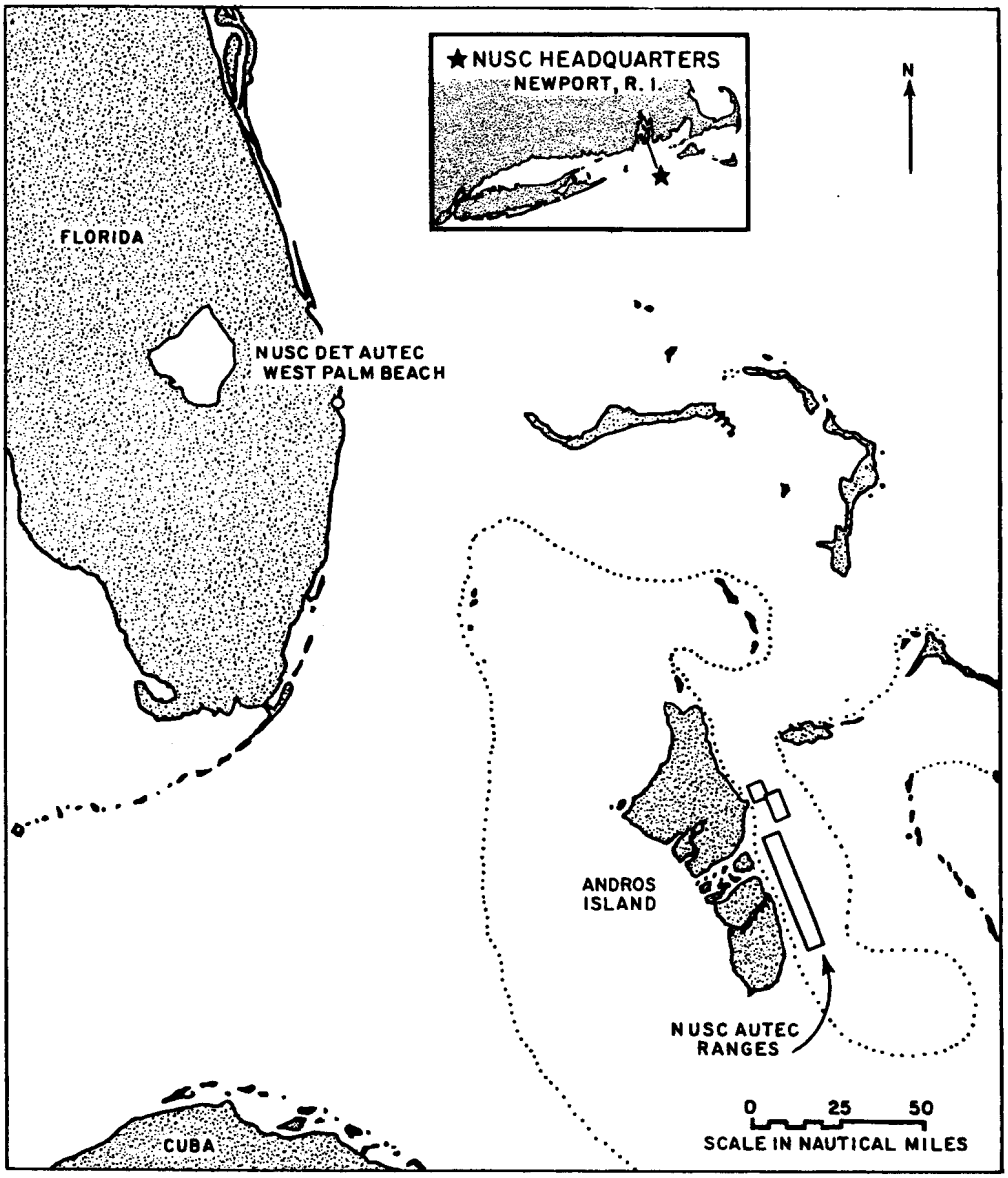
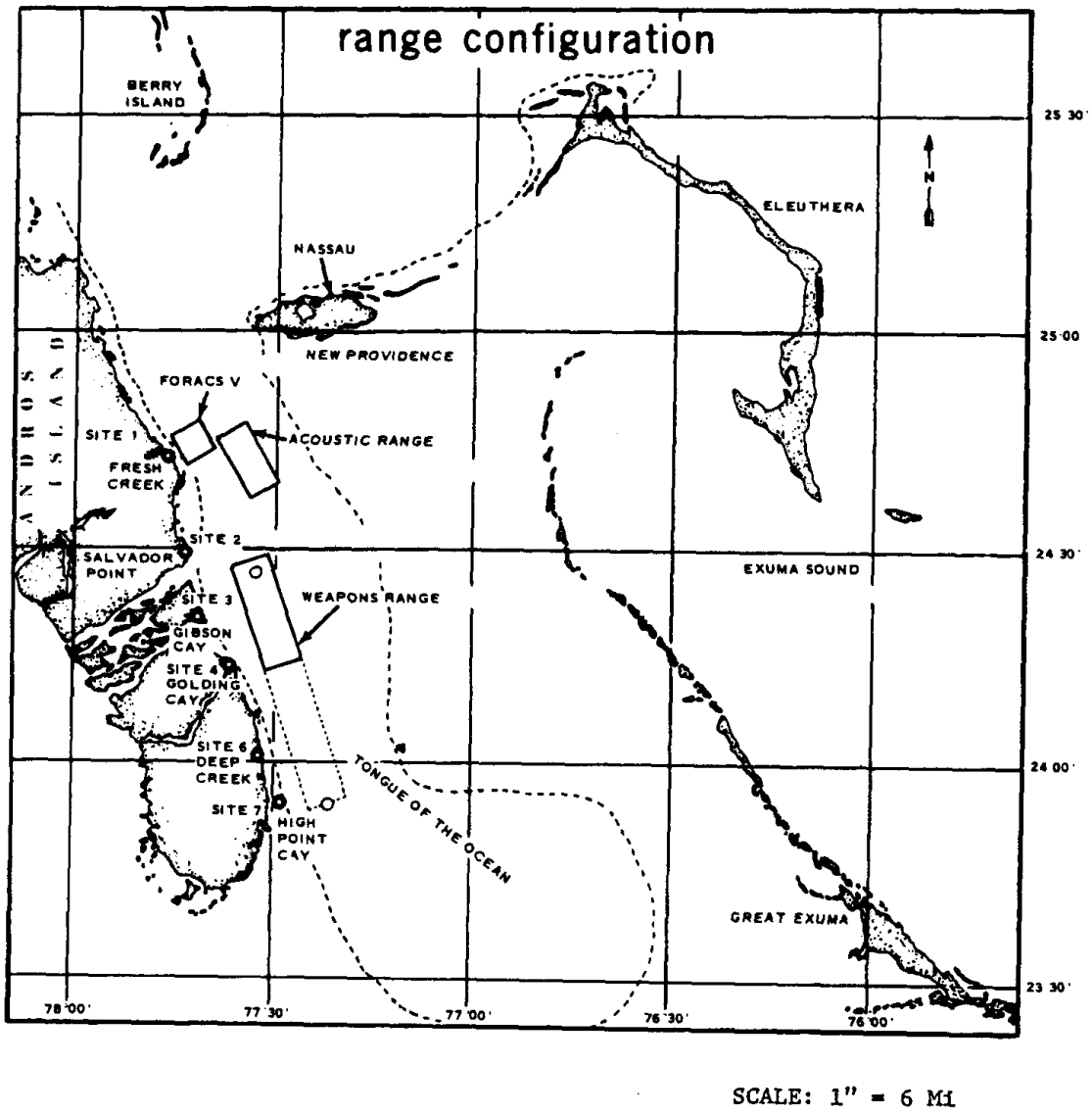


Figure C11.F2. Atlantic Undersea Test and Evaluation Center



C12. CHAPTER 12

ATLANTIC FLEET WEAPONS TRAINING FACILITY

C12.1. MISSION

Operates, maintains, and develops weapon training facilities and services in direct support of the training of Fleet forces and other activities and for the test and evaluation of weapon systems.

C12.2. LOCATION

The Atlantic Fleet Weapons Training Facility (AFWTF) is a tenant shore activity at the Naval Station, Roosevelt Roads, Puerto Rico. It is located approximately 45 miles east of San Juan, Puerto Rico, and has four different operational ranges that are distributed throughout adjacent Atlantic Ocean and Caribbean Sea waters and the eastern part of the Island of Vieques, Puerto Rico, with remote instrumentation sites in the U.S. Virgin Islands and Puerto Rico's adjacent islands.

C12.3. CAPABILITIES

C12.3.1. The AFWTF is a major range capable of supporting Fleet training and testing for a wide spectrum of Naval warfare. It consists of four distinct land and water operational ranges fully instrumented to safely control exercises and to assess Fleet readiness and weapon systems performance whether airborne, surface, or subsurface. It has the capability to prepare, launch, present, recover, and recycle airborne, surface, and undersea targets for Fleet training and OT&E.

C12.3.2. The Outer Ranges, consisting of the ALFA and BRAVO operating areas, provide the open ocean area and airspace volume for exercises and tests involving a single or multiple participants. The combined sea area encompasses about 200,000 square miles, and the land mass, including islands, smaller cays, and the Roosevelt Roads Naval Station, exceeds 33,000 acres. Missile operations, air and surface gunnery, and other exercises are conducted under a simulated tactical environment for maximum realism. Operations are controlled from the Range Operations Center (ROC), located within the AFWTF headquarters at the Naval Station, Roosevelt Roads. A central command and control system electronically displays pseudo real-time information using 16 color, computer-controlled viewing screens at the ROC; this unfolds the developing tactics used by ships and aircraft operating against several different subsonic and

supersonic aerial targets. The ROC is capable of Navy Tactical Data System links with fleet units and maintains communications with all exercise participants.

C12.3.3. The Inner Range consists of air-to-ground, Naval gunfire support (NGFS), and supporting arms target complexes in addition to amphibious training areas located ashore within adjacent waters on the eastern portion of the Island of Vieques, Puerto Rico. Operations are controlled from the observation post at Cerro Matias, Vieques. The range is employed primarily for conventional weapons firing against ground (static or mobile) land and sea targets (MLT/QST) and two BULLSEYE targets provided for air-to-ground inert ordnance drops. BULLSEYE target two also is a designated bomb dummy unit target. Practice mining operations are conducted within the adjacent waters to the north and south of the Inner Range complex. Six point targets and two area fire targets are provided on Three Hills and along the south coast of Vieques for NGFS operations.

C12.3.4. The Underwater Tracking Range (UTR) is an instrumented, underwater tracking facility, consisting of a Control Center at Sprat Hall, St. Croix, U.S. Virgin islands, an 82-square nautical mile acoustic tracking range, and an optical tracking range. The UTR primarily is used for ASW exercises, weapons systems accuracy trials, fleet operational readiness accuracy check site operations (FORACS), MK-48 torpedo certifications exercises, and various surface and underwater RDT&E projects. Shore instrumentation provides precision, real-time, three-dimensional tracking for multiple-submerged objects simultaneously. The optical range is used basically for FORACS. Mobile underwater targets (MK-30) are provided for maximum realism. The MK-30 includes magnetic anomaly detection capability for aircrew training. Torpedo air-drops, surface launches, and ASW rocket firings frequently are conducted.

C12.3.5. The Electronic Warfare Range (EWR) is an integrated complex of threat platform simulators (TPS) intended primarily for the training of Fleet ESM operators. The EWR provides a realistically simulated hostile electromagnetic environment for the training of Fleet EW teams and a tactical electronic order-of-battle in support of exercises conducted within all the AFWTF Ranges. Exercises provided include integrated combat system exercises and antiship missile defense exercises using EW-augmented aircraft, the At-Sea Simulator Platform (converted utility landing craft) equipped with TPS site and underwater noise simulator, as well as strategically located shore-based TPS sites. The EWR has been employed successfully for DT&E and OT&E projects.

C12.3.6. The Naval Station, Roosevelt Roads, and Fleet Composite Squadron EIGHT (VC-8) provide several supporting functions that relate directly and are indispensable to the functioning of the AFWTF. Also, a field office of the Fleet Analysis Center is responsible for receiving missile systems telemetry for analysis.

C12.4. TYPICAL PROJECTS SUPPORTED

C12.4.1. ASROC.

C12.4.2. HARPOON.

C12.4.3. PHOENIX.

C12.4.4. SPARROW.

C12.4.5. SIDEWINDER.

C12.4.6. SHRIKE.

C12.4.7. MK 46/48 Torpedo.

C12.4.8. DD-963, FFG-7, and 688 Class Ship Acceptance Trials.

C12.4.9. Advanced Magnetics Silencing Project (LINEAR CHAIR).

C12.4.10. Fleet Training.

C12.4.11. Air Antisubmarine Warfare Tactics.

C12.4.12. Mine Readiness Certification Inspection.

C12.4.13. Antiship Missile Defense (ASMD).

C12.5. POINT OF CONTACT

Atlantic Fleet Weapons Training Facility
FPO New York 34051
Code: 7112
Telephone: AUTOVON: 831-5316
Commercial: 809-863-2000/5316

Figure C12.F1. Atlantic Fleet Weapons Training Facility, Outer Ranges

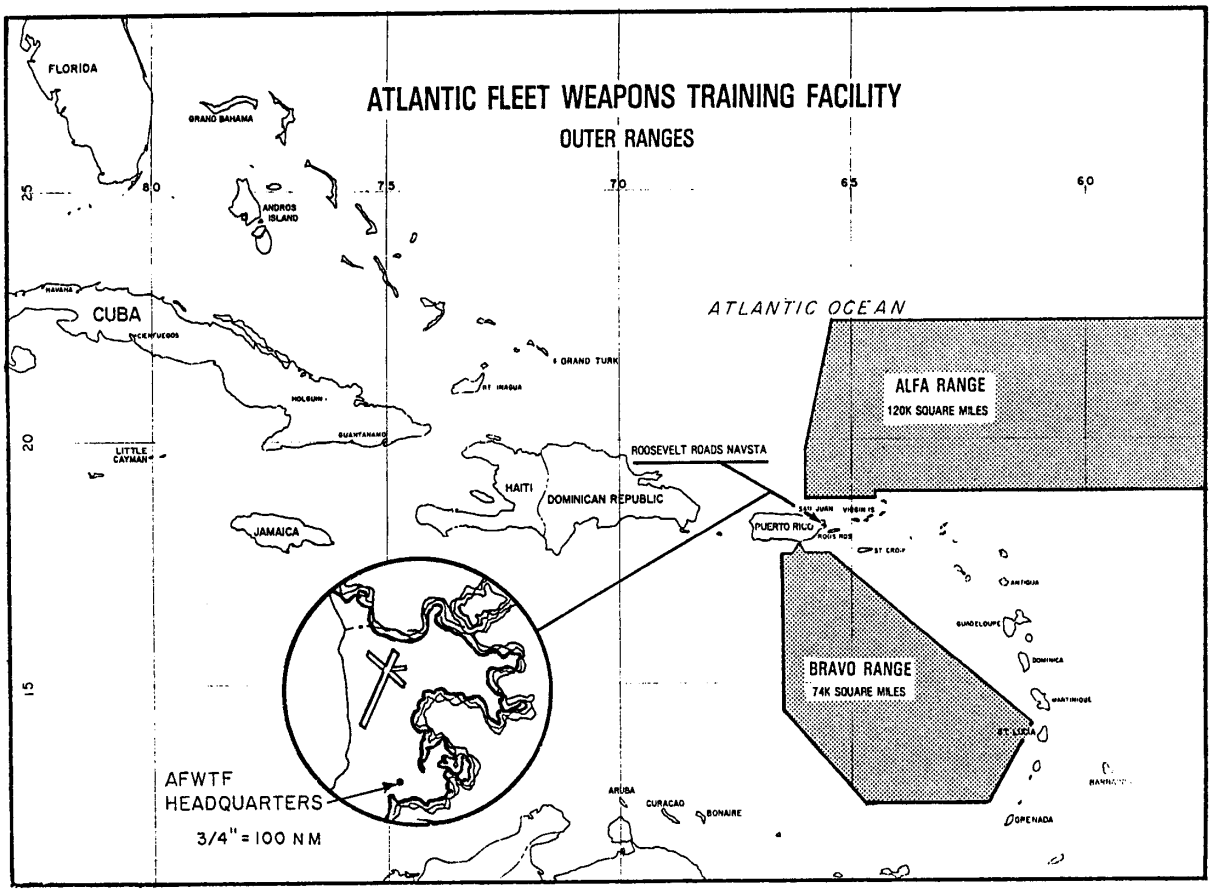
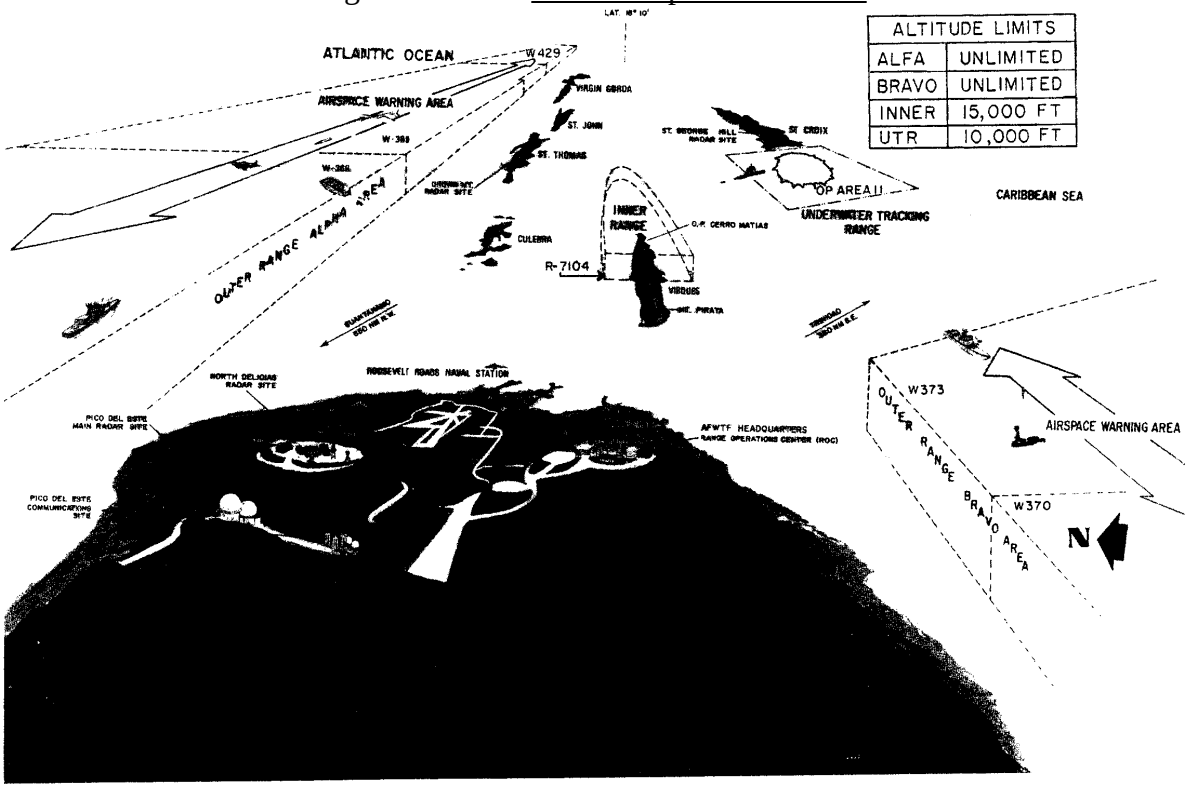


Figure C12.F2. AFWTF Operational Areas



C13. CHAPTER 13

EASTERN SPACE AND MISSILE CENTER

C13.1. MISSION

Manages and operates the Eastern Test Range (ETR). The mission consists of support for launching and testing of missile and space systems from Cape Canaveral Air Force Station (CCAFS) and other launch locations; support of the Space Transportation System launched from Kennedy Space Center (KSC); the operation of an instrumentation ship; support of tenant activities at CCAFS and downrange stations; and support of special projects and R&D tests. Inherent in the ESMC mission is the responsibility for planning, ground and flight safety, engineering, support services, and scheduling of test operations including launch and downrange support.

C13.2. LOCATION

ESMC Headquarters is located at Patrick AFB (PAFB), Florida, on the central east coast of Florida.

C13.3. CAPABILITIES

C13.3.1. CCAFS facilities include launch complexes, missile assembly buildings, and all other elements essential to the assembly, pre-launch, launch, and post-launch operations of test vehicles. Trident basin and other military port facilities at Port Canaveral support the U.S. Navy Fleet ballistic missile ship, submarine operations, and the range support ship. The Naval Ordnance Test Unit, which manages Navy testing on ETR, is located at CCAFS.

C13.3.2. Patrick AFB is an integral part of ESMC and is the technical and logistics center for ESMC. PAFB encompasses 2,108 acres of land with a primary runway (9,000 ft.) instrumented to handle all types of military aircraft. PAFB is also the location for an Air Force hospital, which supports DoD Service members. Located at PAFB as tenants are the Air Force Technical Application Center (AFTAC), the 549th Tactical Air Support Training Group, the 2179th Communications Group, the 2nd Combat Communications Group, the Defense Equal Opportunity Management Institute, and the Army Readiness Group.

C13.3.3. Mainland and downrange stations are located in a chain of sites extending to South Africa, providing launch, midcourse, and terminal coverage for ballistic missiles. A station network provides space launch coverage for low-earth and synchronous orbits and for space operations and orbital tracking of active and passive satellites.

C13.3.4. Precision tracking radars are located at Cape Canaveral, Merritt Island, and PAFB and Grand Bahama, Antigua, and Ascension Islands. Radars are capable of either beacon or echo tracking, providing real-time data to the CCAFS computer. Scanning radars at CCAFS provide aircraft and ship tracking and control. Ship-borne radars provide midcourse and terminal coverage in the broad ocean areas.

C13.3.5. Metric optics capability is available at CCAFS and the Ascension Islands. These systems include precision theodolites, ballistic cameras, and long-range large aperture telescopes. Photo processing facilities are located at PAFB and KSC.

C13.3.6. Missile Impact Location Systems (MILS) provide the primary source of impact data for inert and instrumented reentry bodies. The two systems are the:

C13.3.6.1. Target array (or Pentagon); and

C13.3.6.2. Sonobuoy MILS (SMILS).

C13.3.6.3. Target arrays of bottom-mounted hydrophones are located near Antigua and Ascension Islands. SMILS arrays are located in the broad ocean area. SMILS consists of deep-ocean transponders deployed and surveyed by a range ship and sonobuoys deployed at the time of launch by Navy P-3C aircraft.

C13.3.7. ETR telemetry support consists of land-based stations at Merritt, Grand Bahama, Antigua, and Ascension Islands and of a shipboard station aboard the USNS Redstone. Telemetry aircraft support is provided by C-135 aircraft from Wright-Patterson AFB. Real-time data is available at CCAFS through sub-cable communications down to Antigua Island and through satellite from Ascension Island. Telemetry doppler data capability for metric measurements exists at each downrange site, except for Ascension Island.

C13.3.8. The instrumentation ship, USNS Redstone, can collect telemetry and range safety data on up to four missiles simultaneously. Its primary safety system for fleet ballistic missile operational tests is the flight test support system, which provides a multi-station metric solution aboard the ship using data from a series of remote range stations.

C13.3.9. Wideband communication, in the form of submarine cable, high-frequency (HF) radio, and satellite link, is provided for retransmission of flight vehicle test data to the range control center at Cape Canaveral in real-time or near real-time from remote stations.

C13.3.10. A computer center provides flight safety, weather, scheduling, and instrumentation target designation data support in real-time for each missile and space launch.

C13.4. TYPICAL PROJECTS SUPPORTED

C13.4.1. Atlas Centaur.

C13.4.2. Delta.

C13.4.3. Titan 34D.

C13.4.4. Pershing Follow-on Testing.

C13.4.5. Space Transportation System (Space Shuttle).

C13.4.6. Trident C-4.

C13.4.7. Poseidon C-3.

C13.4.8. Chevaline.

C13.4.9. Short-Range Attack Missile.

C13.4.10. Penguin.

C13.4.11. Ariane.

C13.5. POINT OF CONTACT

ESMC/CC
Patrick AFB, FL 32925
Telephone: AUTOVON: 854-4001
Commercial: 305-494-4001

Figure C13.F1. Eastern Test Range

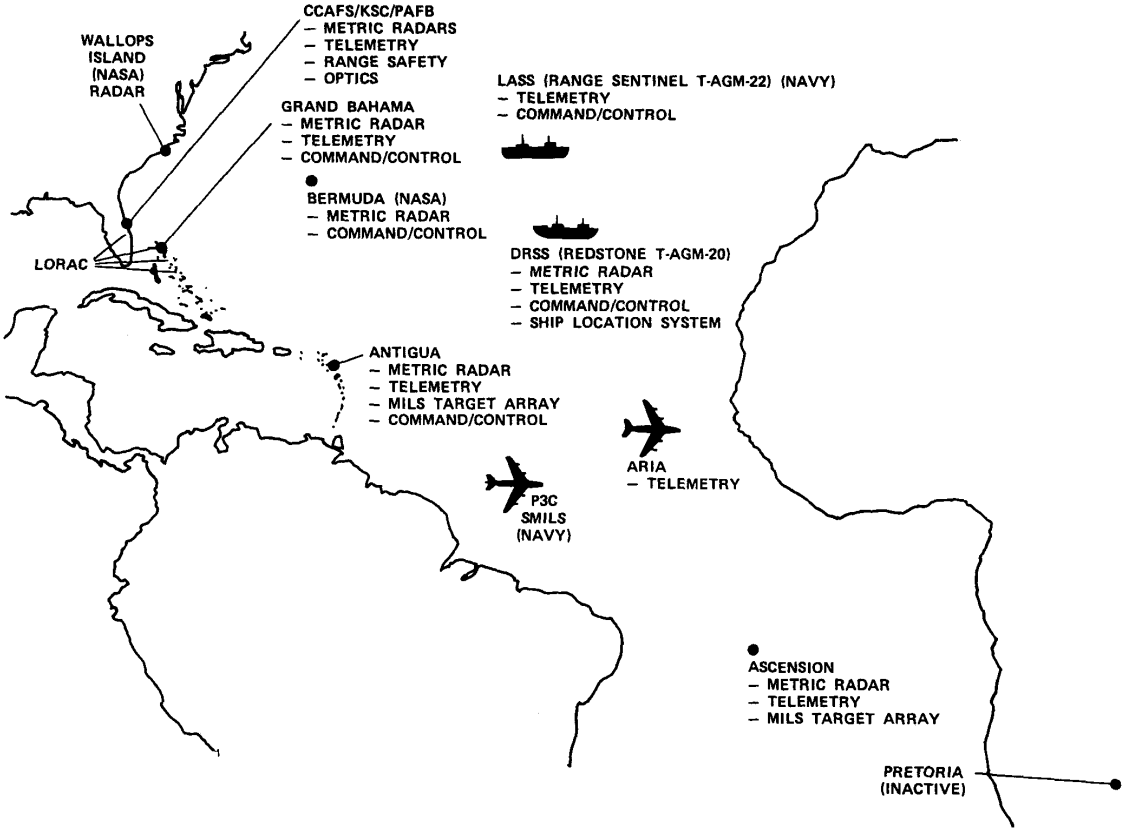
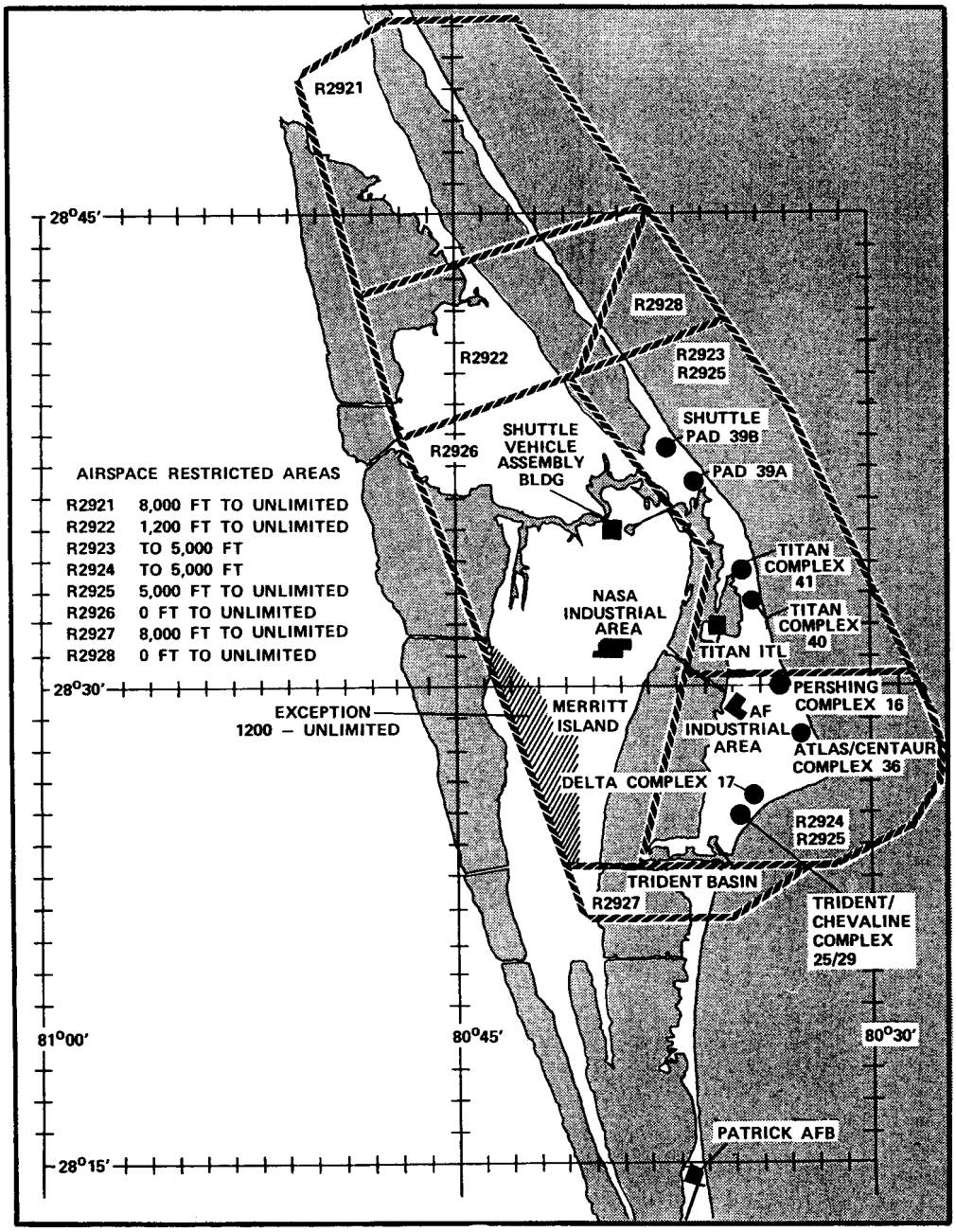


Figure C13.F2. ESMC Launch, Base, Industrial, and Restricted Areas



C14. CHAPTER 14

WESTERN SPACE AND MISSILE CENTER

C14.1. MISSION

Manages and operates the Western Test Range (WTR). The Western Space and Missile Center (WSMC) also manages space and missile field test operations and supports guided missile and aeronautical testing. The WSMC participates in the evaluation of test results and provides support and services to other DoD and non-DoD users.

C14.2. LOCATION

The WSMC is located on Vandenberg AFB on the Central California coast 160 miles northwest of Los Angeles. Vandenberg AFB encompasses 98,400 acres and includes 35 miles of pristine Pacific coastline.

C14.3. CAPABILITIES

C14.3.1. Test Support. The WSMC collects and processes trajectory, telemetry, and optical data for missile, space, aeronautical, and guided missile test operations. The WSMC also provides ground and flight safety, communications, meteorology, and data processing support. In conjunction with other ranges, principally the Pacific Missile Test Range, the Air Force Flight Test Center, and the Kwajalein Missile Range, the WTR gives continuous instrumentation coverage over a broad portion of the western United States and the Pacific Ocean. The WSMC can support space booster and ballistic missile launching across a wide range of launch azimuths (140-310 degrees). This allows direct polar orbit insertion of satellites without overflight of populated areas. Major instrumentation systems operated include the following:

C14.3.1.1. Metric Tracking. Precision radar tracking systems are situated at Vandenberg AFB and Pillar Point AFS, California, and Kaena Point, Hawaii. These radar systems provide trajectory data for range safety, flight analysis, aircraft vectoring, and weather balloon tracking. A variety of reduced metric data products is available.

C14.3.1.2. Telemetry. Receiving and recording stations at Vandenberg AFB and Pillar Point AFS, with their associated antennas, acquire, record, and transmit telemetry data to the Vandenberg AFB data processing equipment through microwave data transmission systems. The display areas are capable of providing real-time computation, quick-look displays, and computer listings.

C14.3.1.3. Optical Tracking. Three large-aperture optical instruments are situated on coastal mountains, one on Vandenberg, one 150 miles north (Anderson Peak), and one 30 miles southeast (Santa Ynez Peak), equipped with both film cameras and intensified video systems for recording ballistic missile launch data and space test events.

C14.3.1.4. Command Control Transmitters (CCT). The WSMC has four CCT sites: two CCT sites at Vandenberg AFB, one at Pillar Point AFS near San Francisco, and one at Laguna Peak near Pt Mugu Naval Air Station, 100 miles southeast. The CCT sites transmit range safety commands to errant missiles or space boosters.

C14.3.2. Midcourse Analysis. The WSMC operates an FPQ-14 radar at Kaena Point, Hawaii, that has been modified with a directed tracking modification (DTM). The DTM reduces errors and allows extremely accurate midcourse tracking of missiles launched from Vandenberg AFB. The Advanced Research Projects Agency (ARPA) Maui Observation Station, Mt. Haleakala, Maui, Hawaii, an optical site with long-range sensitive optics, is available along with telemetry and radar systems in Hawaii.

C14.3.3. Reentry Analysis. The Army-operated complex instrumentation system at Kwajalein Atoll provides an extensive signature data-gathering capability for reentry vehicles that exists at no other site. Within the WTR, broad ocean area targets are being developed to provide reentry vehicle impact scoring telemetry and photography at varying ranges and azimuths from Vandenberg AFB in support of advanced ballistic missile testing.

C14.3.4. Launch Facilities. Current missile launch facilities on Vandenberg AFB consist of Atlas, Titan III, Scout, Minuteman, and Thor complexes with attendant support systems. Soon to be operational will be M-X and Space Transportation System facilities.

C14.3.5. West Coast Offshore Operating Area (WCOOA). The WCOOA extends from San Diego to the Oregon border with possible extension into Alaska. Typically, testing is done within 150 miles of the coastline. The WCOOA is well suited for certain types of aeronautical tests, specifically long-range supersonic runs, sea-to-land

transition tests, tests requiring turbulence-free atmosphere below 10,000 feet, tests requiring the aircraft to fly between sea level and 3,000 feet, and long-range weapons delivery. The Area Control Center accesses seven west coast air surveillance radars, plus one from El Paso, Texas, for space shuttle reentry support.

C14.4. TYPICAL PROJECTS SUPPORTED

The WSMC and the WTR support ballistic missile and space aeronautical programs and associated ground testing. Special project programs (non-launch) supported include electronic equipment development, satellite support, meteorological support, aircraft support, missile launcher ground tests, and drop tests. Examples of major programs supported are the following:

C14.4.1. Minuteman I.

C14.4.2. Minuteman II and III (SAC).

C14.4.3. Peacekeeper.

C14.4.4. Air-Launched Cruise Missile (ALCM).

C14.4.5. Titan, Atlas, and Delta Scout Space Boosters.

C14.4.6. Space Defense System.

C14.4.7. Space Transportation System.

C14.4.8. B-1B Flight Tests.

C14.4.9. NATO E3A Flight Test.

C14.4.10. B-52 IWS.

C14.4.11. Guided Missile Flight Test.

C14.5. POINT OF CONTACT

WSMC/XR
Vandenberg AFB, CA 93437
Telephone: AUTOVON: 276-9749
Commercial: 805-866-9749

Figure C14.F1. Western Test Range

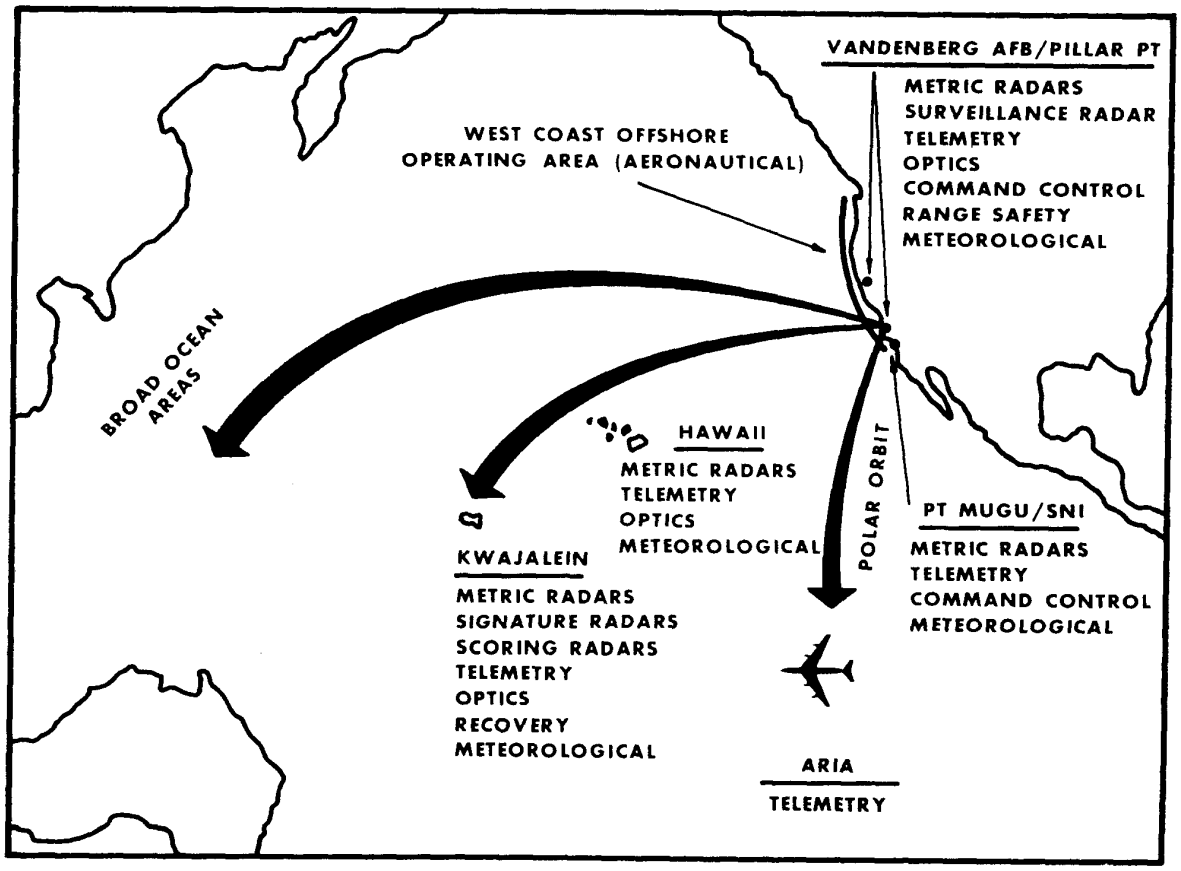
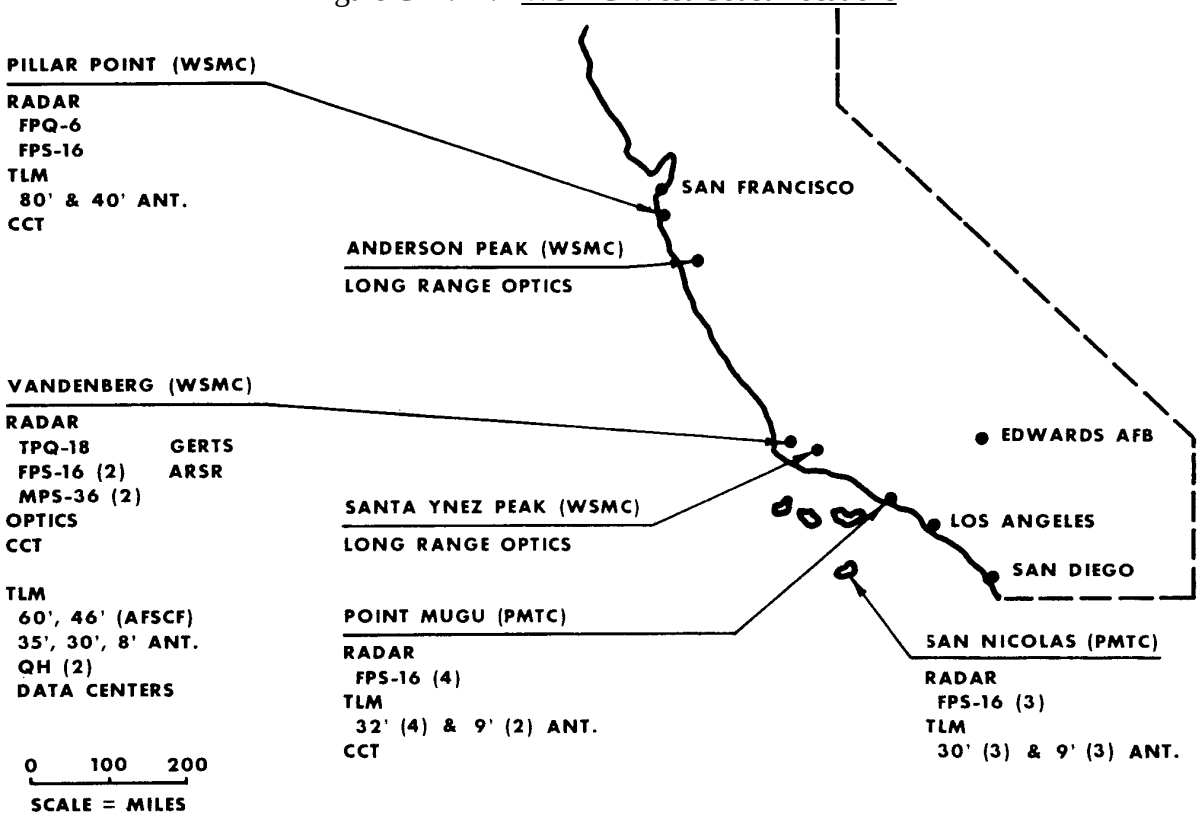


Figure C14.F2. WSMC West Coast Locations



C15. CHAPTER 15

ARNOLD ENGINEERING DEVELOPMENT CENTER

C15.1. MISSION

Manages, develops, and operates ground environmental test facilities in support of R&D of aerospace systems. Performs research and applies new technology for developing advanced test facilities, test techniques, and measurement methodologies associated with simulation of aerodynamic, propulsion, and space flight environments. The Arnold Engineering Development Center (AEDC) supports a broad range of Government and commercial users.

C15.2. LOCATION

The AEDC is located in the middle of Tennessee, 72 miles southeast of Nashville and 61 miles northwest of Chattanooga. The AEDC facility complex (4,000 acres) is located within a 40,000-acre reservation. The isolated location makes it possible, with a minimal environmental impact, to accommodate the next generation of test facilities within its test disciplines.

C15.3. CAPABILITIES

C15.3.1. Wind Tunnels. The nine tunnels range in size from test sections of 1 square foot to 256 square feet and provide coverage over a Mach number range from 0.2 to 10. They are capable of providing performance, stability and control, store separation, heat transfer, ablation, and aeroelastic and loads data. The 16-foot tunnels are unique to this country because they are the only transonic and supersonic wind tunnels where airframe and propulsion integration testing can be done under controlled altitude conditions. The 4-foot transonic and 40-inch and 50-inch supersonic and hypersonic tunnels provide a continuous flow capability and have the most advanced captive trajectory systems available. Low-density facilities also are available.

C15.3.2. Arc Heater Test Units. Three facilities are included in this group. The Dust Erosion Tunnel is equipped for injecting dust of varying size and density into the airflow. The High Enthalpy Ablation Test Facility uses a segmented arc heater capable of a 40-60 megawatt output for several minutes. The air system can provide air up to 270 atmospheres and flow rates up to 90 pound-meters/sec. Primary use of these erosion and ablation facilities is the analysis and evaluation of advanced materials.

C15.3.3. Aeroballistic and Impact Ranges. Four ranges are available, including the 1000-foot Range G complex capable of accelerating models to 23,500 ft/sec at simulated altitudes up to 244,000 feet. The range has a track system to capture and recover the models. The capabilities also include simulating snow, ice, rain, and dust with controlled size and density. Also included is a bird impact range used to investigate the effects of bird strikes on aircraft parts.

C15.3.4. Turbojet or Turbofan Test Cells. Six test cells are available for testing engines from 500 to 70,000 pounds of thrust, from sea level to altitudes of 120,000 feet with true temperature air flows up to Mach 3.3. Icing capability is also available. Engines test capabilities will be enhanced significantly with completion of the Aeropropulsion Systems Test Facility in fiscal year 1985.

C15.3.5. Ramjet Test Cell. This facility provides true temperature air up to Mach 5.6 (hypersonic). Within the performance map of the facility, free jet nozzles with diameters ranging from 18 to 72 inches can be accommodated.

C15.3.6. Rocket Test Cells. Five test cells are available for testing both small and large rockets under altitude conditions up to 170,000 feet, from initial firing to thrust termination. It is possible to test liquid rockets up to a million pounds of thrust and solid rockets up to 300,000 pounds of thrust. One cell is specially equipped for testing rocket motors and engines in ultra-high altitude (simulating space) conditions.

C15.3.7. Space Chambers. Four chambers are available for highly specialized tests including infrared, aerodynamic, space propulsion, solar simulation, and thermal balance. The Mark I is 42 feet in diameter and 82 feet high. The size of the chamber permits testing of all Air Force space systems in a space environment (temperature, pressure, and solar simulation). The chamber size also makes it suitable for zero-g testing and rocket plume signature studies.

C15.4. TYPICAL PROJECTS SUPPORTED

C15.4.1. B-1 and F-15/16.

C15.4.2. Air-Launched Cruise Missile.

C15.4.3. Global Position Satellite.

C15.4.4. Full-Scale Satellite Thermal Vacuum Testing.

C15.4.5. Peacekeeper.

C15.4.6. Minuteman.

C15.4.7. Aircraft Windshield Birdstrike Test.

C15.4.8. Air-to-Surface Air-Launched Missile.

C15.4.9. Advanced Ballistic Reentry System.

C15.4.10. Navy F-18.

C15.4.11. Army Pershing.

C15.4.12. Trident Missile.

C15.4.13. Miniature Vehicle.

C15.4.14. GE CF6-50 Engine.

C15.4.15. AFSC Laboratories.

C15.4.16. Department of Energy.

C15.4.17. Defense Nuclear Agency.

C15.4.18. Industry.

C15.5. POINTS OF CONTACT

Propulsion: AEDC/DOXP
Arnold AFS, TN 37389
Telephone: AUTOVON: 340-7836
Commercial: 615-455-2611, Extension 7836

Aerospace Flight Mechanics: AEDC/DOFX
Arnold AFS, TN 37389
Telephone: AUTOVON: 340-7836
Commercial: 615-455-2611, Extension 7836

Figure C15.F1. Arnold Engineering Development Center

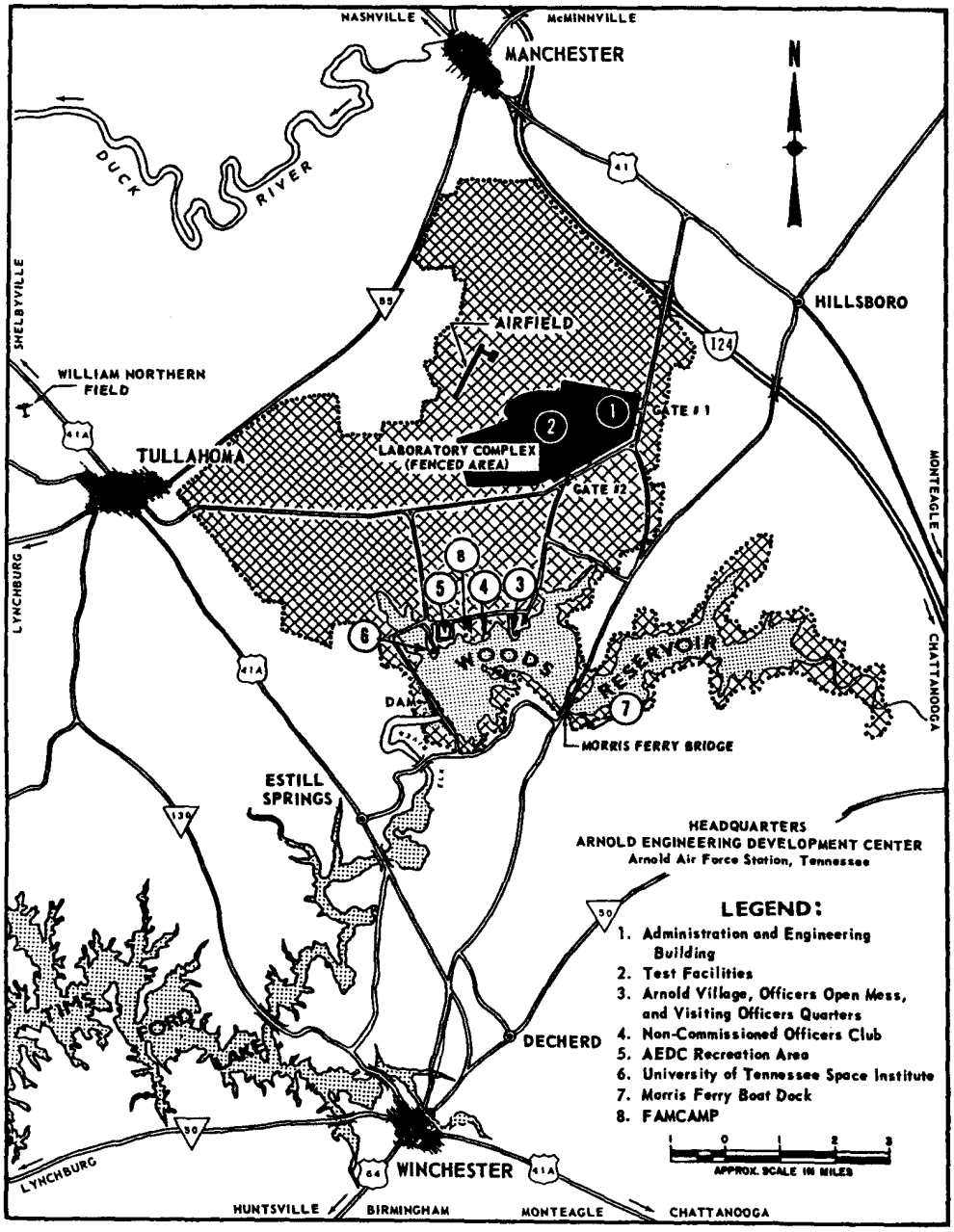


Figure C15.F2. ADEC User Test Facilities (Nominal Values)

ENGINE TEST FACILITY	Test Section Size: Cross Section	Test Section Size: Length	Total Temp. °R	Speed Range	Pressure Altitude (Nominal), ft	Capacity of Installed Thrust Stand, lb	Primary Use*
Propulsion Development Test Cell (T-1)	12.3'D	39'–75'	340–1110	Mach 0–3	Sea Level–120,000	30,000	(1)(2)(3)(4)(6)(9)(11)
Propulsion Development Test Cell (T-2)	12.3'D	32'–68'	340–1110	Mach 0–3	Sea Level–120,000	30,000	(1)(2)(3)(4)(6)(9)(11)
Propulsion Development Test Cell (T-3)	12'D	16'	–	Static	170,000	20,000	(1)(5)(11)
Propulsion Development Test Cell (T-4)	12.3'D	19'–55'	340–1110	Mach 0–3	Sea Level–120,000	30,000	(1)(2)(3)(4)(6)(9)(11)
Propulsion Development Test Cell (T-5)	7'D	17'	410–1110	Mach 0–3.0	Sea Level–100,000	5,000	(1)(2)(3)(4)(6)(7)(11)
Propulsion Development Test Cell (T-6)	3'D	18'	430–760	Mach 0–3.0	Sea Level–100,000	None	(1)(3)(4)(6)(7)(11)
Propulsion Development Test Cell (J-1)	16'D	72'	395–1210	Mach 0–3.2	Sea Level–120,000	50,000	(1)(2)(3)(4)(6)(9)(11)
Propulsion Development Test Cell (J-2)	20'D	69'	450–1210	Mach 0–3.2	Sea Level–120,000	70,000	(1)(2)(3)(4)(6)(9)(11)
Rocket Development Test Cell (J-2A)	18.3'D	32'	(Wall, 144)	Static	450,000	20,000	(1)(5)(11)
Rocket Development Test Cell (J-3)	14 or 18'D	28'–40' High	–	Static	125,000	200,000	(1) (5)
Rocket Development Test Cell (J-4) Test Capsule Spray Chamber	48'D 100'D	Variable to 125' 250'	– –	Static Static	100,000 130,000	500,000 25,000	(1)(5)(11) (5)(11)
Rocket Development Test Cell (J-5)	16'D	50'	–	Static	120,000	300,000	(1)(5)(11)
Aerodynamic and Propulsion Test Unit	16'D	70'	2200 Clean Air	Mach 0–5.0	80,000	None	(1)(3)(4)(6)(7)(9)(11)

PROPULSION WIND TUNNEL FACILITY	Test Section Size: Cross Section	Test Section Size: Length	Total Temp., °R	Speed Range	Pressure Altitude, ft	Dynamic Pressure, psf	Reynolds No./ft	Primary Use*
Propulsion Wind Tunnel (16T)	16' x 16'	40'	540–600	Mach 0.20–1.5	Sea Level–90,000	50–950	0.2×10^6 to 6.0×10^6	(4) (6) (9)
Propulsion Wind Tunnel (16S)	16' x 16'	40'	580–1080	Mach 1.5–4.75**	45,000–155,000	25–550	0.2×10^6 to 2.5×10^6	(4)(6)(7)(9)
Aerodynamic Wind Tunnel (4T)	4' x 4'	12.5'	540–600	Mach 0.2–1.3, 1.6, 2.0	Sea Level–65,000	20–1400	2×10^5 to 7.0×10^6	(6)
Aerodynamic Wind Tunnel (1T)	1' x 1'	3.12"	80–120 above Ambient	Mach 0.20–1.5	Sea Level–25,000	85–1220	1.5×10^6 to 5.3×10^6	(6)

High Enthalpy Ablation Test (HEAT)	Nozzle Exit Diameter, in.		Total Enthalpy	Mach Number		Model Pressure, atm		
	0.75–1.6	With Dust 0.83–1.4	1800–6000 Btu/lb	1.8–3.0	With Dust 1.8–2.5	10–150	With Dust 10–100	(14)

Dust Erosion Tunnel (DET)	Nozzle Exit Diameter, in.	Total Enthalpy	Dust Velocity, 100 μ	Model Stagnation Pressure, psia	Dust Size, μ
	STA 75 127.5 207 4.36 8.32 15.34	400–1800 Btu/lb	3000–5500 fps	STA 75 127.5 207 27.29 0.9–1.0 0.3–0.4	50–100–250–650–1000–2000

VON KARMAN GAS DYNAMICS FACILITY	Test Section Cross Section	Total Pressure, psia	Total Temp., °R	Speed Range	Pressure Altitude, ft	Dynamic Pressure, psf	Reynolds No./ft	Primary Use*
Supersonic Wind Tunnel (A)	40" x 40"	1.5–200	530–750	Mach 1.5–6	16,000–151,000	49–1780	3×10^6 to 9.2×10^6	(6) (7)
Hypersonic Wind Tunnel (B)	50"D	20–900	700–1350	Mach 6 or 8	98,000–180,000	36–660	3×10^6 to 5.3×10^6	(6) (7)
Hypersonic Wind Tunnel (C)	50"D	200–2000	1650–1950	Mach 10	132,000–188,000	46–430	3×10^5 to 2.4×10^6	(6) (7)
Supersonic Wind Tunnel (D)	12" x 12"	1–60	530	Mach 1.5–5	5000–157,000	37–3100	2.6×10^5 to 1.6×10^7	(6)
Hypersonic Wind Tunnel (E)	13.25"D	100–1250	1150–1400	Mach 8	105,000–160,000	78–820	5×10^5 to 5×10^6	(6) (7)
Hypervelocity Wind Tunnel (F)	25"D	1300–8600	1100–2000	Mach 7	45,000–85,000	1600–10,600	4.5×10^5 to 45×10^6	(6) (7)
	40"D	2500–9700	2300–2700	Mach 9–10.6	80,000–116,000	700–3300	2×10^6 to 18×10^6	(6) (7)
	48"D	5000–16,000	2500–3000	Mach 12–13	120,000–135,000	500–1100	2.4×10^4 to 4.4×10^6	(6) (7)
Hypervelocity Range/Track (G)	120"D	–	–	To 24,000 fps	244,000 maximum	–	–	(8)
Hypervelocity Range/Track (K)	72"D	–	–	To 28,000 fps	299,000 maximum	–	–	(8)
Meteorological Wind Tunnel (L)	12.25"D	1.5–16	380–560	10–300 fps	Sea Level–50,000	–	–	(13)
Hypervelocity Impact Range (S1)	Target Tank 30"D	–	–	To 32,000 fps	Sea Level–10^5 Torr	–		(10)
Bird Impact Range (S3)	–	–	–	200–1350	Sea Level	–	–	(10)

AEROSPACE CHAMBERS	Test Chamber Size: Diameter	Test Chamber Size: Height or Length	Wall Temp., °K	Chamber Empty Pressure, Torr	Pressure Altitude, miles (1962 U S Stand. Atmos)	Thermal Radiation Simulation	Primary Use*
Aerospace Environmental Chamber (Mark I)	42'	82'	77	10^{-7}	210	Collimated solar and programmed heat flux	(5)
Aerospace Chamber (7V)	7'	12'	4–77	10^{-8}	400	3'-diam carbon arc solar and programmed tungsten lamp heat flux system	(5)
Aerospace Chamber (10V) (Low Density Flow Facility)	10'	20'	77	10^{-7}	200	Tungsten lamps	(6) (11)
Aerospace Chamber (12V)	12'	35'	77	10^{-7}	200	8'- diam xenon solar and programmed tungsten lamps	(5)

*USE LEGEND: Testing of (1) Rockets (2) Turbojets (3) Ramjets (4) Missile Base Heating Models (5) Space Environmental Tests (6) Aerodynamic Models (7) Aerothermodynamic Models (8) Aeroballistic Models (9) Combined Aerodynamic Inlet and Propulsion System Tests (10) Impact Studies (11) Free Jet Expansion of Rocket Exhaust Plumes (12) Ablative Materials (13) Meteorological Instruments (14) Ablative and Erosive Materials

**Maximum Mach number currently limited to 2.4.

C16. CHAPTER 16

TACTICAL FIGHTER WEAPONS CENTER

C16.1. MISSION

Provides an operationally oriented, combat-like range facility where multiple air and ground participants can accomplish integrated air-to-air and air-to-ground training and T&E missions.

C16.2. LOCATION

The Tactical Fighter Weapons Center (TFWC) is located at Nellis Air Force Base, 8 miles northeast of Las Vegas, Nevada.

C16.3. CAPABILITIES

C16.3.1. The range complex covers approximately 6,000 square miles over desert terrain, with north-south mountain ranges separated by valleys and dry lakebeds. Elevations of the area vary from 2,500 feet to 10,000 feet mean sea level. Dry climate results in excellent flight conditions year-round.

C16.3.2. Training for single sorties to joint exercises of several hundred aircraft can be accommodated.

C16.3.3. North Ranges. Two electronic combat (EC) areas (Tonopah EC Range and Tolicha Peak EC Range) provide a realistic enemy radar environment for aircrew training.

C16.3.3.1. Range 71. Located in the northwest corner of R-4807. This tactical range consists of nuclear bombing circles, simulated missile sites, a convoy, an airfield, an industrial area, and a forward edge of the battle area. Live ordnance, except cluster bomb units (CBU), is authorized on target 74-10. All other targets are for training and inert ordnance, flares, rockets, and gun ammunition.

C16.3.3.2. Range 75. Unmanned range consisting of missile sites and a convoy located in the central portion of R-4807. Training and inert ordnance and live ordnance (except for CBU munitions) are authorized.

C16.3.3.3. Range 76. Located in the southwestern portion of R-4807 with airfields, missile site, industrial areas, railroad, railroad tunnel, convoys, and forward-edge-of-the-battle-area arrays. Training and inert ordnance is allowed on all targets. Live ordnance is allowed on certain targets as defined in local guidance.

C16.3.4. South Ranges. Provide for air-to-air and air-to-ground munitions delivery, air-to-air combat maneuvering (including air combat maneuvering instrumentation), and realistic ground target simulation.

C16.3.4.1. Range 61. Located in the northwest corner of R-4806. The single target is a simulated ICBM site located on the eastern side of the range.

C16.3.4.2. Range 62. Located on the east side of R-4806. The majority of the targets are located in and around Dogbone Lake. The targets include nuclear bomb circles and tactical targets consisting of an airfield, supply area, anti-aircraft artillery, convoys, and a surface-to-air missile site.

C16.3.4.3. Range 64/64A. Located in the western side of R-4806. Training and inert and live ordnance, except for CBU munitions, are authorized on all targets on Range 64.

C16.3.4.4. Dart East. Located within the boundaries of Ranges 61 and 62. The range is 9 nautical miles wide and 27 nautical miles long; the east side is marked at the south and north ends with diamond-shaped figures bladed on the ground. Gun ordnance, training projectile (TP), and training projectile tracer (TPT) are the only ordnance authorized.

C16.3.4.5. Dart West. Located within the boundaries of Ranges 64 and 65. The range is 11 nautical miles wide and 20 nautical miles long. The east side is marked at the south and north ends by diamond-shaped figures bladed on the ground. Only gun ordnance, TP, and TPT are authorized.

C16.3.4.6. Air Combat Maneuvering Instrumentation (ACMI). The ACMI is a computerized tracking and monitoring system used for air-to-air testing, training, and tactics development. The ACMI areas overlay most of R-4806 and Alamo Air Traffic Control Assigned Airspace Areas.

C16.3.5. Air-to-ground UHF communications are available to both EW ranges, the OT&E range, and the bombing and gunnery range.

C16.3.6. Available instrumentation and test equipment includes a television ordnance scoring system to determine impact and miss-distance for bomb drops; radars for target acquisition and laser target designators; optical equipment (cinetheodolites, tracking cameras, tracked telescope, and motion picture and still photography); and a variety of range targets.

C16.3.7. A range control center provides real-time test control, air traffic management, and range data management.

NOTE: No airspace within the range complex will be overflown unless scheduled through the Range Group Scheduling Branch (AUTOVON 682-5143).

C16.4. TYPICAL PROJECTS SUPPORTED

C16.4.1. Aircraft: F-15, F-5, A-10, F-16, F-4, T-38, and A-7.

C16.4.2. Training: Transition, Functional Check Flights, Air Combat, Electronic Combat, and Aerobatics.

C16.4.3. Other: Operational Test and Evaluation (OT&E), Red Flag, EWCAS, AIMVAL/ACEVAL, ALCM, GLCM, and Gallant Eagle.

C16.5. POINTS OF CONTACT

Current Capabilities	Future Capabilities
554 RG/EN	554 RG/XD
Nellis AFB, NV 89191	Nellis AFB, NV 89191
Telephone: AUTOVON: 682-3637	Telephone: AUTOVON: 682-3643
Commercial: 702-643-3637	Commercial: 702-643-3643

Figure C16.F1. TFWC North Range

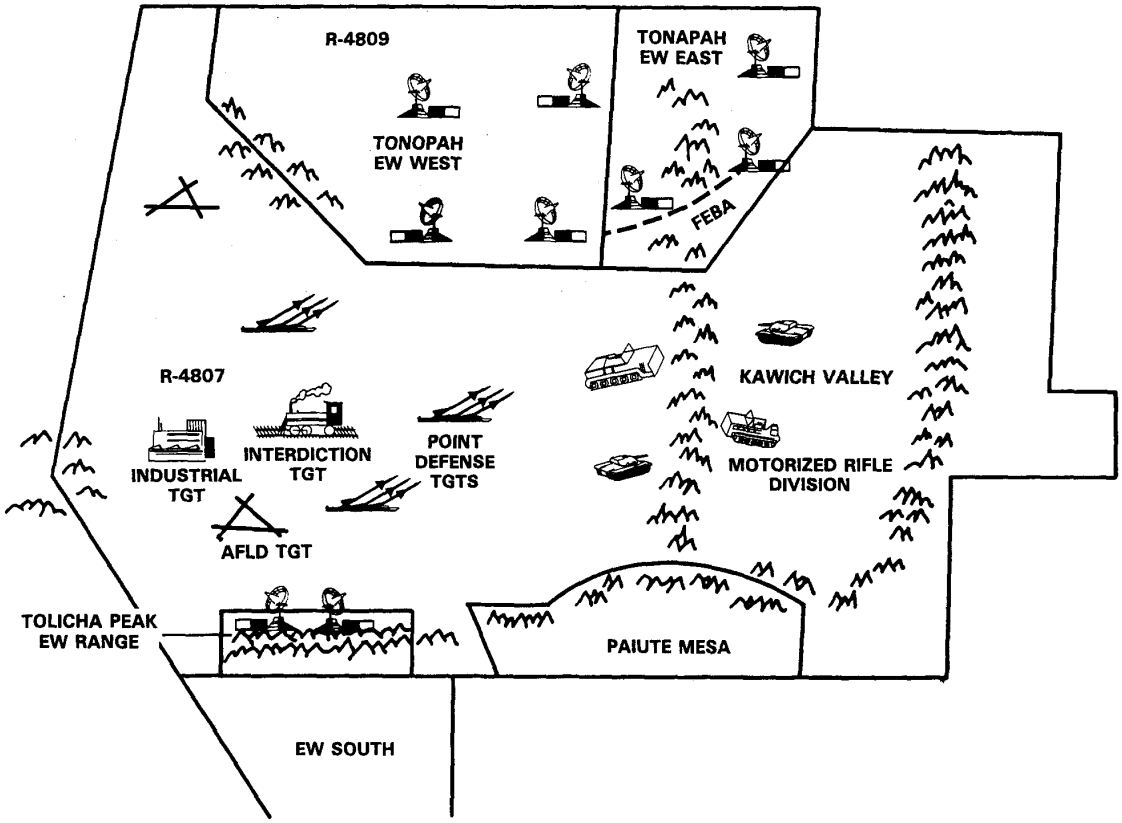
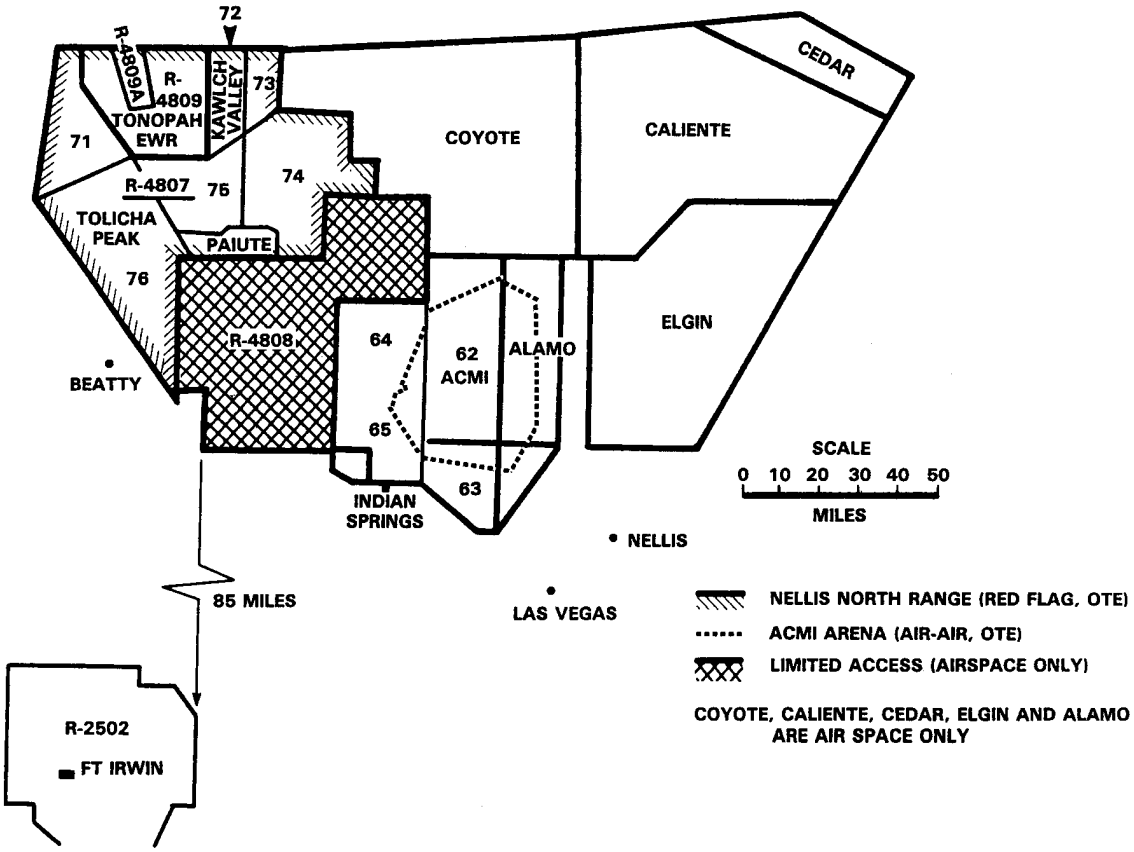


Figure C16.F2. TFWC Range Complex



C17. CHAPTER 17

AIR FORCE FLIGHT TEST CENTER

C17.1. MISSION

Plans, accomplishes, and reports on Air Force development, test, and evaluation (DT&E) of manned and unmanned aircraft systems; participates in and reports on test of operational flight simulator trainers; supports and participates in Air Force initial operational test and evaluation (IOT&E) and follow-on tests of manned aircraft systems; tests manned experimental and research aerospace vehicles; tests parachute systems and aerodynamic deceleration devices; operates the USAF Test Pilot School; conducts or supports artificial icing tests for the Air Force and other Governmeint Agencies; develops, controls, and operates test facilities used to support flight testing; and supports operational functions, such as the Air Force Rocket Propulsion Laboratory, the NASA Hugh L. Dryden Flight Research Center, and the Army Aviation Engineering Flight Activity.

C17.2. LOCATION

The Air Force Flight Test Center (AFFTC) is located at Edwards AFB, about 100 miles northeast of Los Angeles, on the western edge of the Mojave Desert.

C17.3. CAPABILITIES

C17.3.1. Flight Test Range Capabilities

C17.3.1.1. Take-Off and Landing Facility. Uninterrupted photographic time-space positioning data on a 300 foot wide by 15,000 foot long main runway, with transition to Rogers Dry Lake.

C17.3.1.2. Low, Medium, and High Altitude Supersonic Corridors

C17.3.1.3. Four aircraft spin areas (two instrumented), from 10,000 feet mean sea level to unlimited altitude.

C17.3.1.4. Precision Impact Range Area (PIRA). Includes dual air-to-ground gunnery range used for precision bombing, rocket firing, stores separation, evaluation of photo and infrared reconsystems, and other tests requiring precision ground instrumentation. The alpha corridor provides supersonic airborne entry into the PIRA.

C17.3.1.5. Photo and Infrared Resolution Range. Targets include 18 bar type, one tridensity, five circle, one oblique, 14 check-cross patterns, and an infrared tactical range with a variety of surveyed targets.

C17.3.1.6. Radar Fidelity and Geometric Range (RADFAG). Various reflector arrays and wide assortment of corner reflectors for forward and side-looking radar.

C17.3.2. Technical Support Capabilities

C17.3.2.1. Mission Control Complex. Main AFFTC scientific data processing and display complex that monitors flight test missions in real time.

C17.3.2.2. Data Acquisition and Reduction Facilities. Instrumentation engineering, range facilities, airborne and ground photography, television and various specialized range instrumentation, and large-scale digital computers are available.

C17.3.2.3. Integration Facility for Avionics Systems Testing. Reliable means of testing, identifying problem areas, and improving integrated avionics systems concurrently with flight test programs.

C17.3.2.4. Flight Test Simulation Facility. Simulation capability using digital computers, cockpits, and six degree-of-freedom motion base.

C17.3.2.5. Additional facilities available to support flight testing include Runway Meteorological System, Weight and Balance Facility, Flutter and Ground Vibration Systems, and a Subsonic Airspeed Calibration Facility.

C17.3.3. Surface

C17.3.3.1. The AFFTC has 65 square miles of usable landing area on base with runway lengths up to 7.5 miles. Numerous dry lakebeds suitable for emergency landing exist throughout the southwest test range area to the Utah Test and Training Range.

C17.3.3.2. Nineteen aircraft hangar complexes, three with two hangar bays, include office space for engineering and administrative personnel, shop, and laboratory

spaces. Thirteen hangars are located on the main base, four at the north base (ideal for classified programs), and two at the south base.

C17.3.4. Airspace. R-2508 California Restricted Area complex (12,000 to unlimited) with military operating area and forward air traffic control assigned airspace area extends approximately 130 nautical miles north, 30 nautical miles east, and 40 nautical miles west of Edwards AFB. Jointly managed by AF'FTC, Naval Weapons Center, George AFB, and Army National Training Center. Radar approach control netted to all above mission control centers. Air traffic control exists (surface to unlimited) throughout most of R-2508 complex. Data links interconnect airspace and technical capability at the Naval Weapons Center, the Pacific Missile Test Center, and the Western Space and Missile Center.

C17.4. TYPICAL PROJECTS SUPPORTED

C17.4.1. Flying qualities, performance, flutter, air loads, avionics, and other flight tests (F-15, F-16, F-5, ALCM, B-52, Airborne Warning and Control System, and B-1).

C17.4.2. Aerodynamic decelerator testing.

C17.4.3. USAF Test Pilot School.

C17.4.4. Runway arresting gear test compatibility with Air Force aircraft.

C17.5. POINT OF CONTACT

AFFTC/XR
Edwards AFB, CA 93523
Telephone: AUTOVON: 350-3837
Commercial: 805-277-3837

Figure C17.F1. Air Force Flight Test Center, Edwards Air Force Base, CA

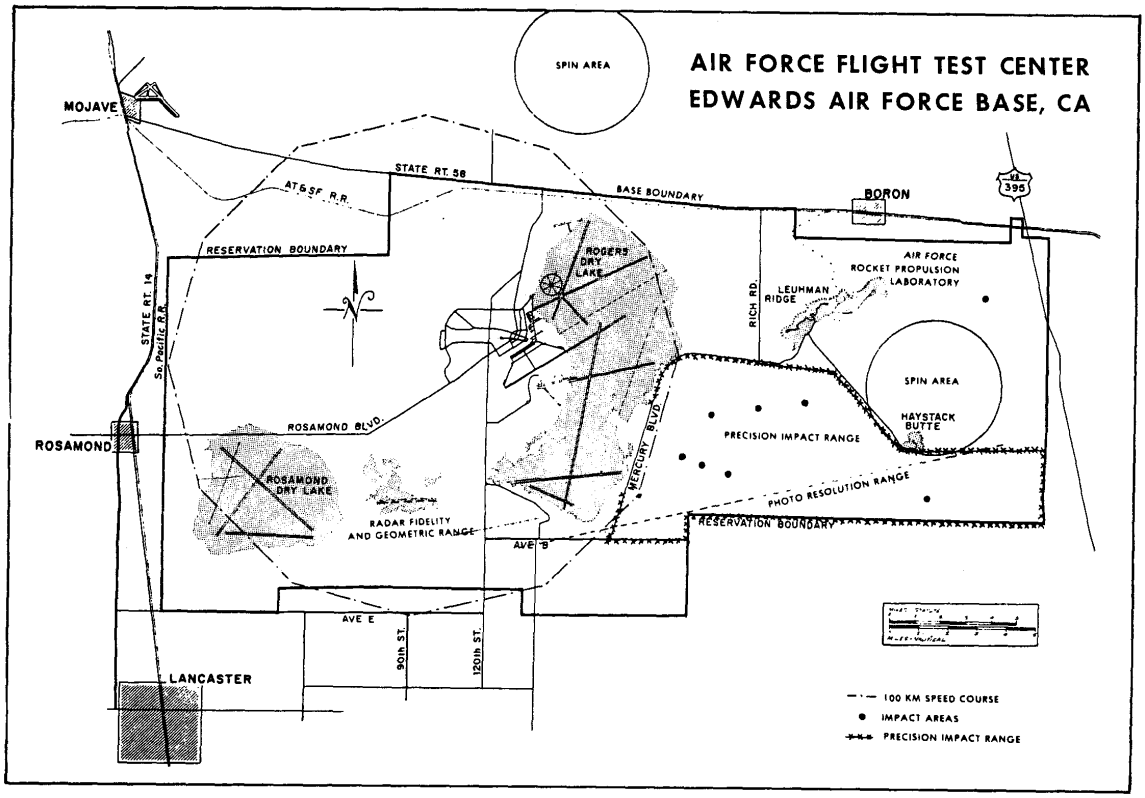
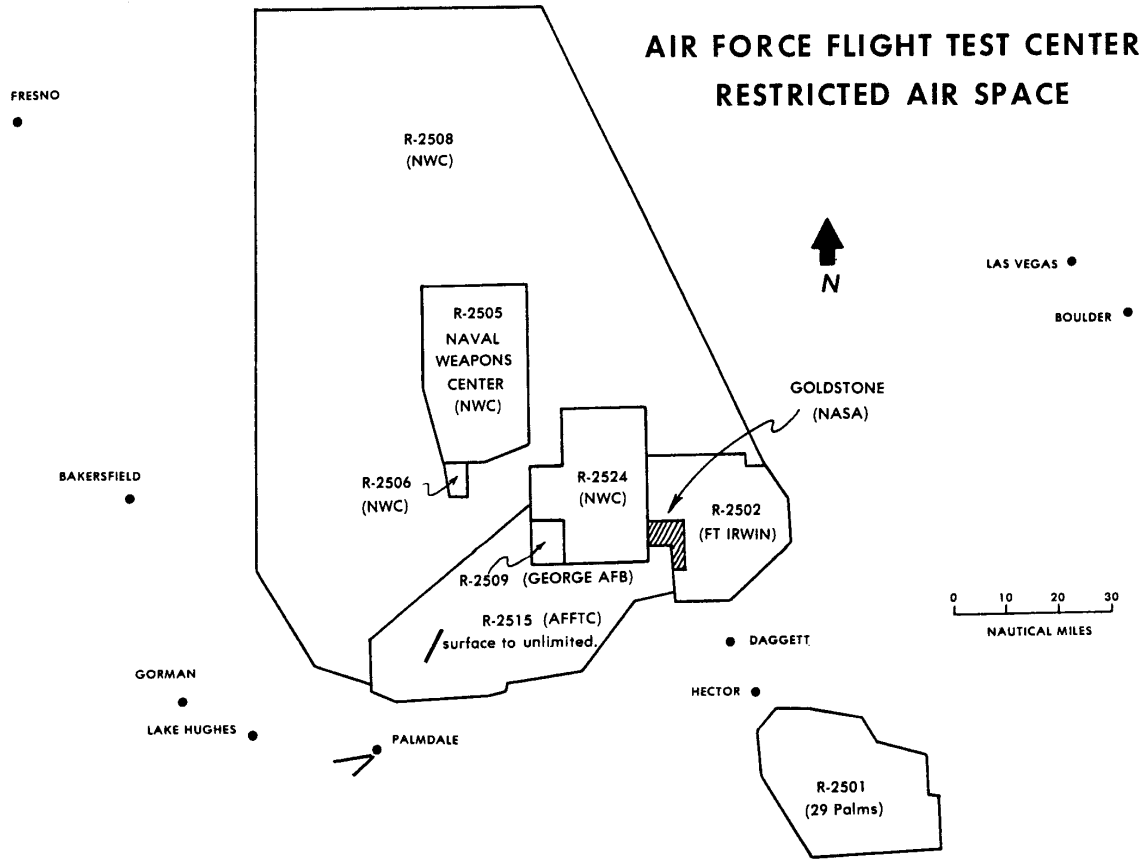


Figure C17.F2. Air Force Flight Test Center, Restricted Air Space



C18. CHAPTER 18

UTAH TEST AND TRAINING RANGE

C18.1. MISSION

Provides range facilities for all phases of T&E of manned and unmanned aircraft systems and tactical training for air-to-air and air-to-ground weapon delivery for the Department of Defense and other Governmeint Agencies.

C18.2. LOCATION

C18.2.1. The Utah Test and Training Range (UTTR) is contained within the Great Salt Lake Desert, approximately 70 miles west of Salt Lake City, Utah. The UTTR consists of two large restricted ranges: the North Range, with an airspace approximately 23 by 49 miles, and the South Range, with airspace area approximately 50 by 68 miles. Restricted airspace extends from the surface to 58,000 feet on both ranges. Both North and South Ranges are bounded by the military operating areas (MOAs).

C18.2.2. The landspace is characterized by high-country deserts, undulating sand dunes, mountains rising abruptly from the desert floor, and rolling hills building up to mountain ranges. The DoD-owned landspace of 2,136 square nautical miles is surrounded by public domain and is not likely to be surrounded by population centers in the foreseeable future.

C18.2.3. UTTR management is the responsibility of the 6501st Range Squadron, located at Hill AFB, Utah. The 6501st Range is responsible to the 6545th Test Group and the AFFTC.

C18.3. CAPABILITIES

C18.3.1. Instrumentation Facilities

C18.3.1.1. The High Accuracy Multiple Object Tracking System (HAMOTS), a multi-lateration system, tracks, records, and displays the position of test vehicles at the UTTR. HAMOTS collects the time-space-position information (TSPI) of one or more targets for real-time display at the mission control center (MCC).

C18.3.1.2. The UTTR radar network is composed of two precision tracking radars and a surveillance radar system. Both tracking radars are linked by microwave to the MCC at Hill AFB and displayed on plotboards. Radar information may be sent to Edwards AFB by microwave through the data acquisition and transmission system. Surveillance radar (AN-GPN12) is provided by the 299th Communication Squadron (Clover Control) of the Utah Air National Guard.

C18.3.1.3. The UTTR has 12 cinetheodolites to provide TSPI on test vehicles. Six cinesextants and a full range of high-speed cameras provide documentary photography.

C18.3.1.4. Two range telemetry acquisition stations and a ground station are located in the MCC at Hill AFB. A mobile telemetry acquisition system is available to be located anywhere on the Range Complex where there is a capability to interface with the microwave system.

C18.3.2. Computer Facilities. The UTTR provides a full range of data processing, using four SEL 32/75, CYBER 73 located at Hill AFB and two CYBER 74 located at Edwards AFB.

C18.3.3. Mission Control Center. The MCC serves as the UTTR primary operational control, communication, and data collection center. Located in Building 1274 at Hill AFB, the MCC can display real-time HAMOTS and radar TSPI data on a large screen display and plot boards, respectively. The telemetry can be recorded and displayed on stripcharts.

C18.3.4. Targets. The UTTR has a variety of target facilities to support both the operational and test communities.

C18.3.4.1. Eagle Range is a standard AFR 50-46 scorable air-to-ground range with two bomb circles, skip targets, two acoustical strafing panels, and various armored vehicles.

C18.3.4.2. Helicopter Air-to-Ground Range is an unmanned range with various armored vehicles deployed to provide a realistic tactical scenario.

C18.3.4.3. Wildcat and Baker's Strongpoint Ranges consist of simulated industrial complexes, bunkers and command post complexes, airfield (complete with surface-to-air missile sites), convoys, railroad yards, and aircraft in revetted positions. Wildcat Range has a real-time television optical scoring system.

C18.3.4.4. Kitty Cat Range is a live ordnance drop area with three track vehicles that resemble an artillery fire support base.

C18.3.4.5. Munitions test targets are used to test new munitions and conduct shelf-life surveillance testing. Each of the 26 targets has been developed for a specific application using live and inert munitions.

C18.4. TYPICAL PROJECTS SUPPORTED

C18.4.1. Cruise missile testing (ALCM, GLCM, SLCM), Maverick missile testing, aircraft systems testing.

C18.4.2. Shelf-life testing of conventional munitions.

C18.4.3. Full spectrum of "Back Yard" Range Activity to joint-training exercises.

C18.5. POINT OF CONTACT

6501 Range Squadron/TIRX
Hill AFB, UT 84056
Telephone: AUTOVON: 458-7852
Commercial: 801-777-7852

Figure C18.F1. Utah Test and Training Range

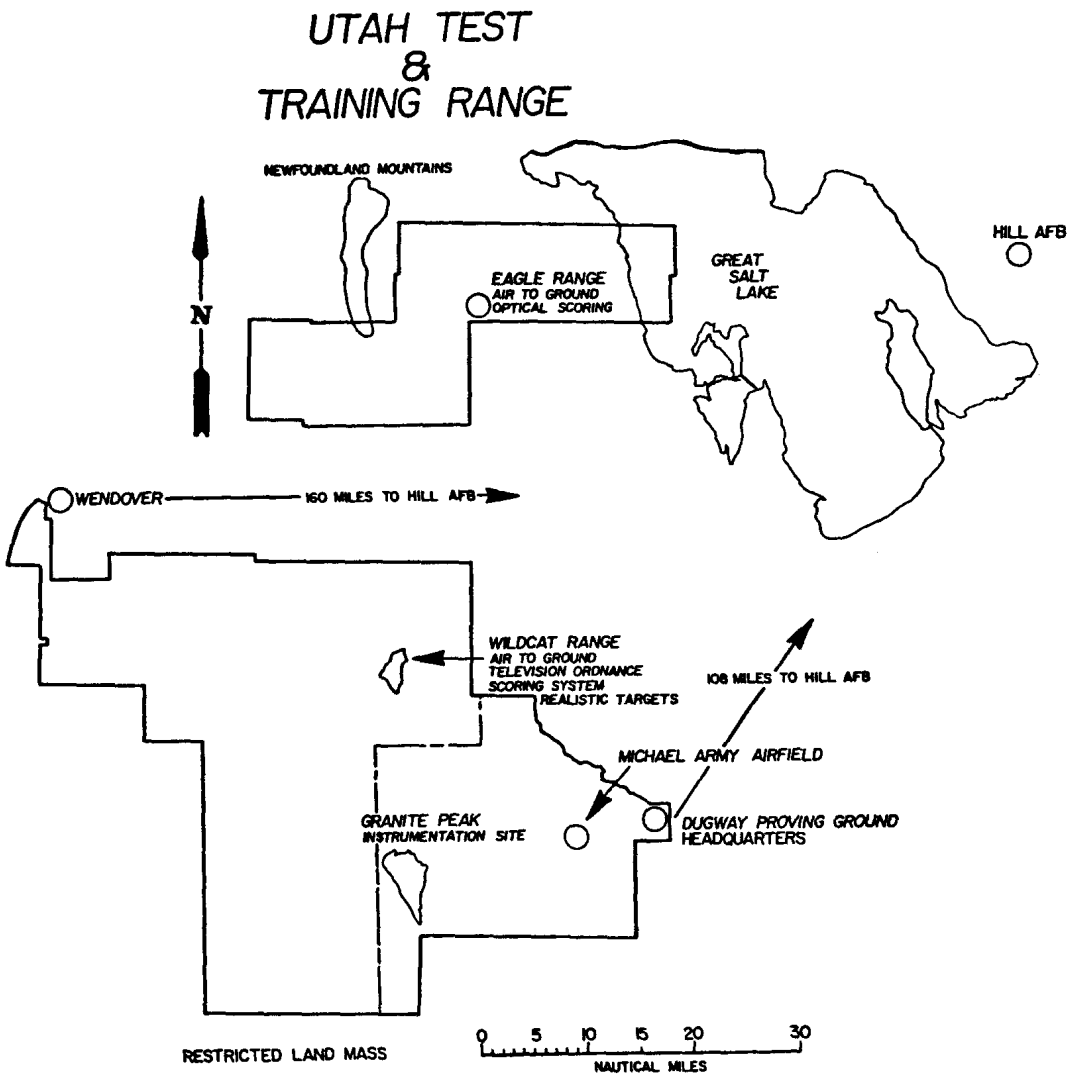
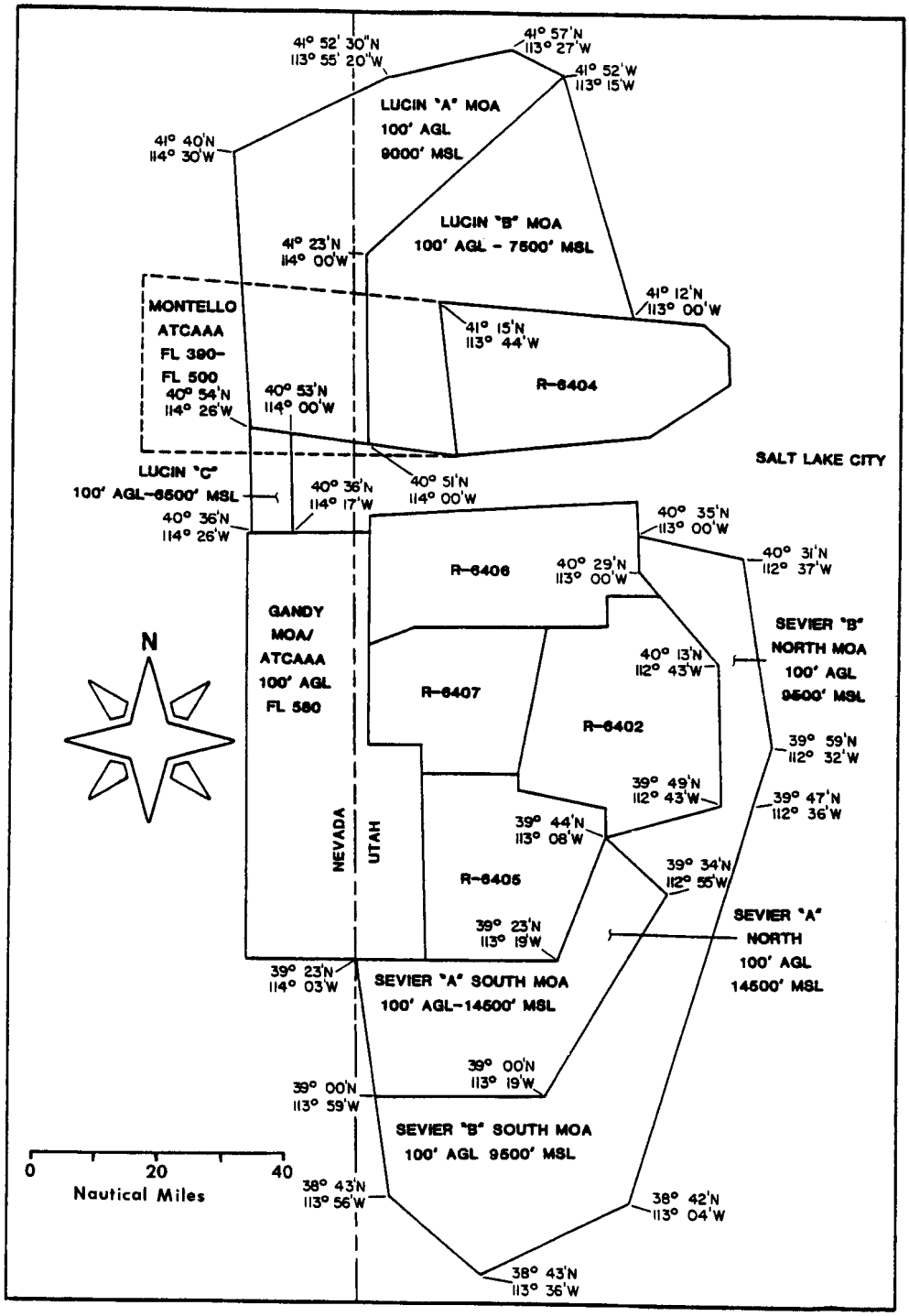


Figure C18.F2. Utah Test and Training Range Airspace



C19. CHAPTER 19

ARMAMENT DIVISION
3246TH TEST WING

C19.1. MISSION

Provides the DT&E of non-nuclear air armament for the Air Force. This includes air-launched tactical and air defense missiles, guided weapons, non-nuclear munitions, aircraft guns and ammunition, and aerial targets and T&E of Electronic Combat (EC) systems and climatic simulation. Support is also provided for operational training, OT&E of armament and EC systems, and other activities conducted by operational commands.

C19.2. LOCATION

The Eglin land range areas (724 sq. miles) are located in northwest Florida with the water test ranges (98,000 sq. miles) covering most of the Gulf of Mexico.

C19.3. CAPABILITIES

C19.3.1. The Armament Systems Test Environment (ASTE) consists of varied multi-environmental land test areas, instrumentation, and airborne capability needed for air armament DT&E and OT&E. Twenty-seven highly instrumented land test areas are dedicated to air-to-surface testing. Low- and high-altitude and supersonic flight profiles can be accommodated. Included are static arenas for warhead and lethality evaluations, aircraft gun test areas, 2000-foot dual-rail sled track, and numerous air-to-air, air-to-surface, and surface-to-air test areas.

C19.3.2. The Electromagnetic Test Environment (EMTE) is a highly instrumented simulated hostile defense system consisting of tracking, search, and height-finder radars operating in different frequency bands and modes. The complex system can separately or simultaneously support noise and deception jammer evaluations, dynamic chaff and aircraft reflectivity measurements, RF and optical countermeasures evaluations, dynamic antenna pattern measurements, and tactics evaluation.

C19.3.3. Multiple-Purpose Resources (MPRs) include tracking radars, phototheodolites, communications, frequency control and analysis, telemetry, command guidance and destruct, real-time data, and range safety control capabilities. The MPRs are used in conjunction with the ASTE and EMTE.

C19.3.4. Water Test Areas are used extensively for air-launched munitions test and training and as a maneuvering area for EC missions.

C19.3.5. Simulation Facilities are available to support a broad spectrum of T&E. Environmental testing of entire aircraft systems as large as the C-5 aircraft can be accommodated in the free world's largest climatic facility. Military standard environmental testing capabilities are available in the Fuze Test Facility to support small subsystems and component testing. New technology guided weapons seekers and countermeasure techniques are tested in the Seeker Evaluation Test Simulation Facility.

C19.3.6. Base and Installation Security Systems encompass 752 acres and are dedicated to the evaluation of security systems against typical threat scenarios approximating actual operational conditions.

C19.3.7. Seeker Evaluation Instrumentation Systems provide radiometric, spatial, and spectral measurements of background and target signatures in ground and airborne scenarios for the visible through IR and millimeter wave portions of the electromagnetic spectrum. The capability also exists to test weapon seekers in a captive "real world" situation.

C19.3.8. Central Control Facility (CCF) provides test managers real-time mission analysis and the capability to control their missions from the Eglin Main Base. The multipurpose computers supporting the CCF have access to most range resources (radars, telemetry, and airborne units) and allow conduct of up to four missions from the CCF simultaneously.

C19.3.9. Range Engineering Personnel provide the in-house engineering capability to rapidly modify existing facilities or acquire additional unique test capabilities in order to tailor the range to meet unique project requirements.

C19.4. TYPICAL PROJECTS SUPPORTED

C19.4.1. Ordnance and Munitions:

C19.4.1.1. Warhead Performance.

C19.4.1.2. Fuzing.

C19.4.1.3. Terminal Effects.

C19.4.1.4. Aerodynamics.

C19.4.1.5. Ballistics.

C19.4.1.6. Aircraft Compatibility.

C19.4.2. Guided Weapons:

C19.4.2.1. Air-to-Air.

C19.4.2.2. Air-to-Surface.

C19.4.3. Target Acquisition.

C19.4.4. Electronic Systems.

C19.4.5. Sensors - EO, Laser, IR Millimeter Wave.

C19.4.6. Electromagnetic Warfare.

C19.4.7. Base Installation Security System.

C19.4.8. Climatic Simulation.

C19.5. POINT OF CONTACT

AD/XP
Eglin AFB, FL 32542
Telephone: AUTOVON: 872-3488
Commercial: 904-882-3488

Figure C19.F1. Armament Division Eglin Text Complex

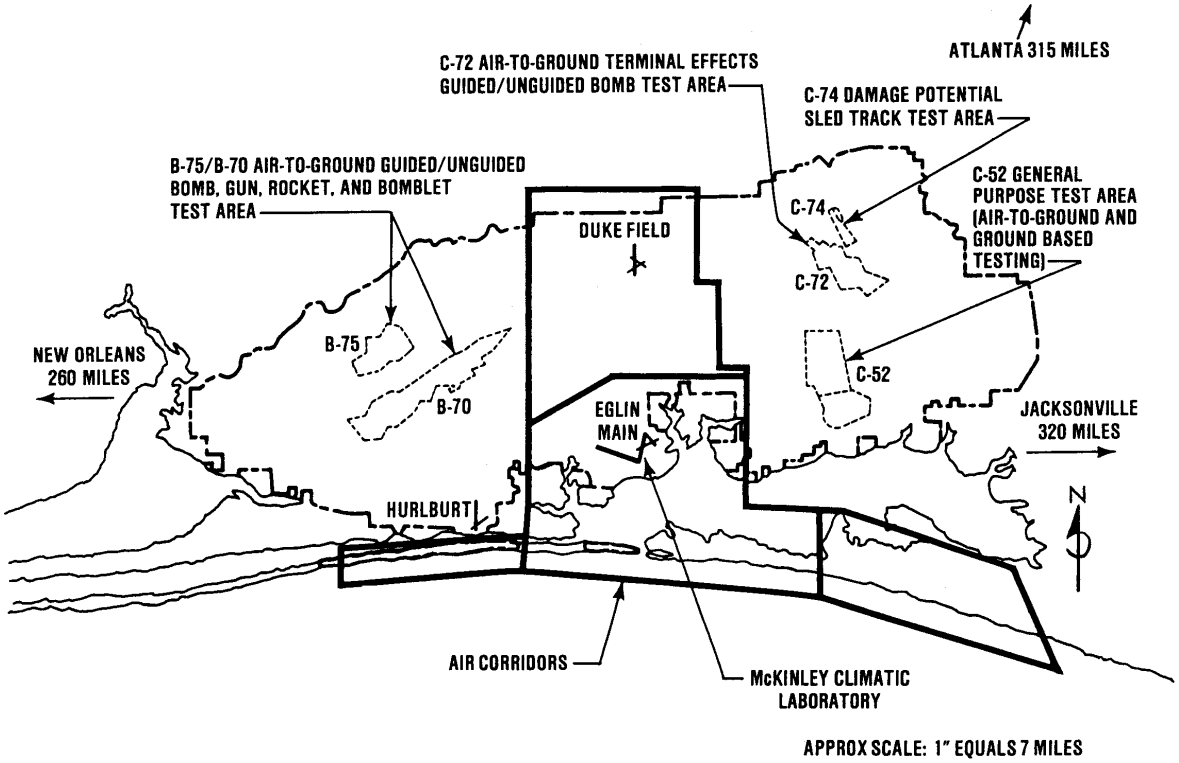
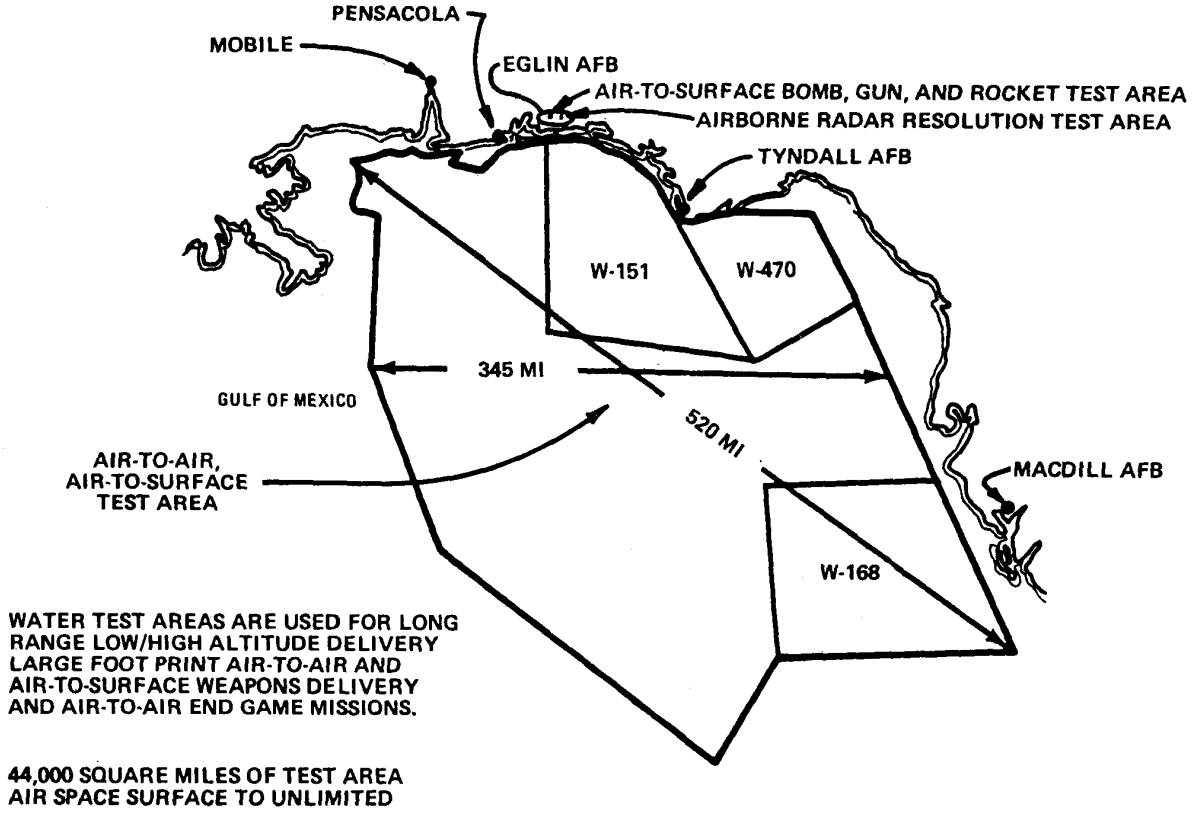


Figure C19.F2. Eglin Water Test Areas



C20. CHAPTER 20

ARMAMENT DIVISION
6585th TEST GROUP

C20.1. MISSION

Provides test and evaluation of aerospace navigation and guidance systems and components, simulation of dynamic flight conditions using the high-speed test track, radar antenna pattern and cross-section measurements, and operational and maintenance support of Air Force Systems Command (AFSC) test aircraft staging out of Holloman AFB. The Test Group is the DoD focal point for verification testing of aircraft inertial navigation systems. It is the sponsor for Air Force users of the White Sands Missile Range (WSMR), controls all WSMR airspace, and provides liaison for the WSMR in all FAA matters.

C20.2. LOCATION

The 6585th Test Group is located at Holloman AFB, Alamogordo, New Mexico.

C20.3. CAPABILITIES

C20.3.1. This Test Group is a multiple-discipline organization that accomplishes the necessary DT&E of aerospace guidance and navigation systems and components using laboratory, aircraft, and sled test facilities; provides dynamic tests of aerospace hardware by use of the high-speed test track, which provides realistic flight conditions and recovery of the test item; subscale and full-scale radar backscatter measurements of various types of vehicles, systems, and components; provides chase aircraft and photography of AFSC project aircraft conducting tests on the WSMR; and the development of the necessary facilities, capabilities, and modern test technology to support the assigned programs, including instrumentation, analysis, and data processing.

C20.3.2. The Guidance Test Division operates the Central Inertial Guidance Test Facility (CIGTF) and provides test, evaluation, and analysis of components and systems applicable to missile guidance and aircraft navigation. The CIGTF, located in a seismically quiet area, provides an environment that is essential for testing to the accuracy levels required for high accuracy guidance systems. The CIGTF can test hardware to 100 g's on a precision 260-inch radius centrifuge arm. A combined environmental test chamber can provide a service environment by programing

simultaneous application of altitude (pressure), temperature, humidity, and vibration. Gyro and accelerometer test tables at the CIGTF provide position accuracy of 0.36 arc seconds. A completely integrated reference instrumentation system (CIRIS) is available as a spatial reference to test aircraft navigation systems. The accuracies of CIRIS are 13 feet in position, 0.1 feet/second in velocity, and 5 arc minutes in attitude. Project 688G, Aircraft Navigation System Verification, provides flight test verification of new developments of aircraft inertial navigators before selection into the DoD inventory. Up to six new navigation systems are verified each year.

C20.3.3. The Test Track Division operates and maintains the high-speed test track. This aerospace ground test facility has capabilities for dynamic testing of crew escape systems; aerodynamic decelerators; rain, dust, and particle erosion; guidance and aeropropulsion systems; for impact testing, hypersonic and transonic aerodynamic testing at high Reynolds numbers, dispenser system testing, and explosive blast testing; and for launch into free flight. This track is the longest (50,788 feet), most precisely aligned, and most highly instrumented of its kind. The master rail is aligned within .005 inch with respect to a reference (fiducial) line established with better than first-order accuracy over its nearly 10-mile length. A precision space time system provides a velocity reference better than 0.01 feet/second. Speeds up to 8,200 feet/second have been demonstrated. Depending upon the payload size, accelerations above 200 g's have been demonstrated, and sled weights range from 100 to 30,000 pounds.

C20.3.4. The Radar Target Backscatter Facility (RATSCAT) Division provides full-scale and subscale radar cross-section measurements of rockets, missiles, reentry vehicles (warheads and decoys), aircraft, aircraft weapons, bombs, radar absorber materials, aerospace vehicles, chaff and debris, rocket plumes, trucks, and other aerospace and ground-based objects. The RATSCAT facility is isolated physically and electromagnetically by its location in the alkali flats area of the WSMR. The facility and its location permit precise, controlled, and repeatable radar cross-section measurements. Two 140-foot towers and a 200-foot tower provide look-down measurement capabilities. Bistatic measurements up to 160 degrees can be performed. A large target rotator is capable of supporting full-size aircraft and large missiles. The test radars dynamic range is 70 decibels and targets as small as 0.0001 square meters may be measured at frequencies up to and including 13 GHz. A model-making facility is an integral part of the RATSCAT capability.

C20.3.5. The Aeronautical Test Division provides operational and maintenance support for AFSC flight test aircraft staging out of Holloman AFB. Support of other DoD flight test requirements is available. Cargo and transport testbed aircraft that are required to support the CIGTF for evaluation of navigation systems are provided by the 4950th Test Wing at Wright-Patterson AFB, Ohio. Fighter aircraft from the Armament

Division, Eglin AFB, are operated and maintained by the Aeronautical Test Division and staged out of Holloman AFB in support of CIGTF tests and missile development tests conducted on the WSMR. The Division also provides WSMR scheduling, a flight-planning facility, life-support equipment services, aircrew briefings, aerial photographic support, a Government flight representative, and liaison for transient testers.

C20.3.6. The Deputy for the Air Force/WSMR serves as sponsor for all Air Force programs testing on the range.

C20.4. TYPICAL PROJECTS SUPPORTED

C20.4.1. Peacekeeper and Trident missile guidance systems and components.

C20.4.2. 688G project aircraft inertial navigation systems, including Standard INS.

C20.4.3. B-52 OAS/IWS.

C20.4.4. Space Telescope Gyros.

C20.4.5. B-1B avionics.

C20.4.6. Peacekeeper missile guidance launch simulation.

C20.4.7. HBU-X lap belt.

C20.4.8. M739 P.D. fuze.

C20.4.9. MK-82 bunker target munition.

C20.4.10. QF-100 antenna and cross-section testing.

C20.4.11. PQM-102.

C20.4.12. B-1 114 scale model.

C20.4.13. Firebee drone.

C20.4.14. HAVE RUST.

C20.4.15. AMRAAM.

C20.4.16. PAVEMOVER.

C20.4.17. AIM-9P.

C20.4.18. ACES-II ejection system.

C20.5. POINT OF CONTACT

6585th Test Group/PXR
Holloman AFB, NM 88330
Telephone: AUTOVON: 867-4366
Commercial: 505-479-4366

Figure C20.F1. 6585th Test Group, Holloman Air Force Base, New Mexico

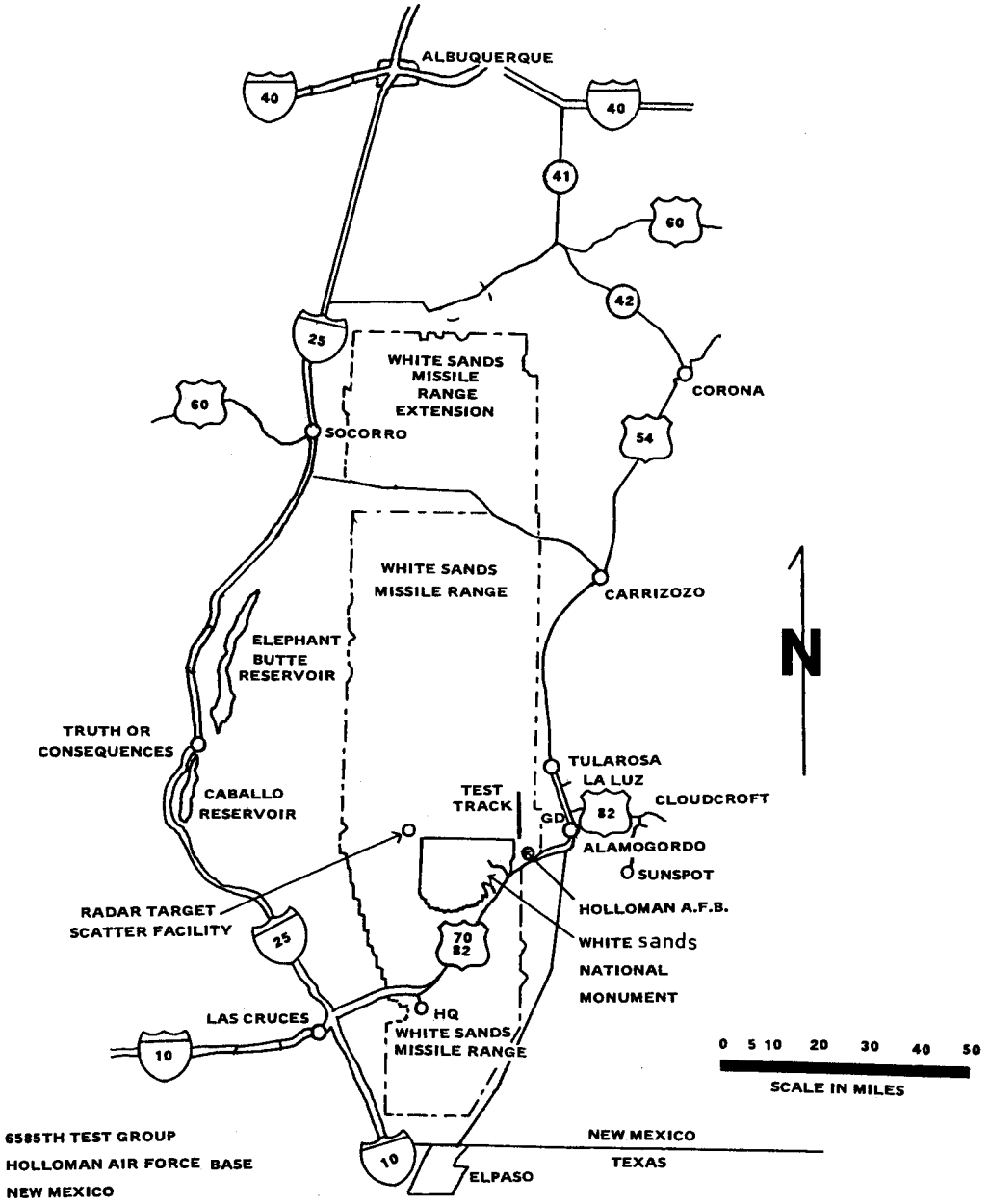
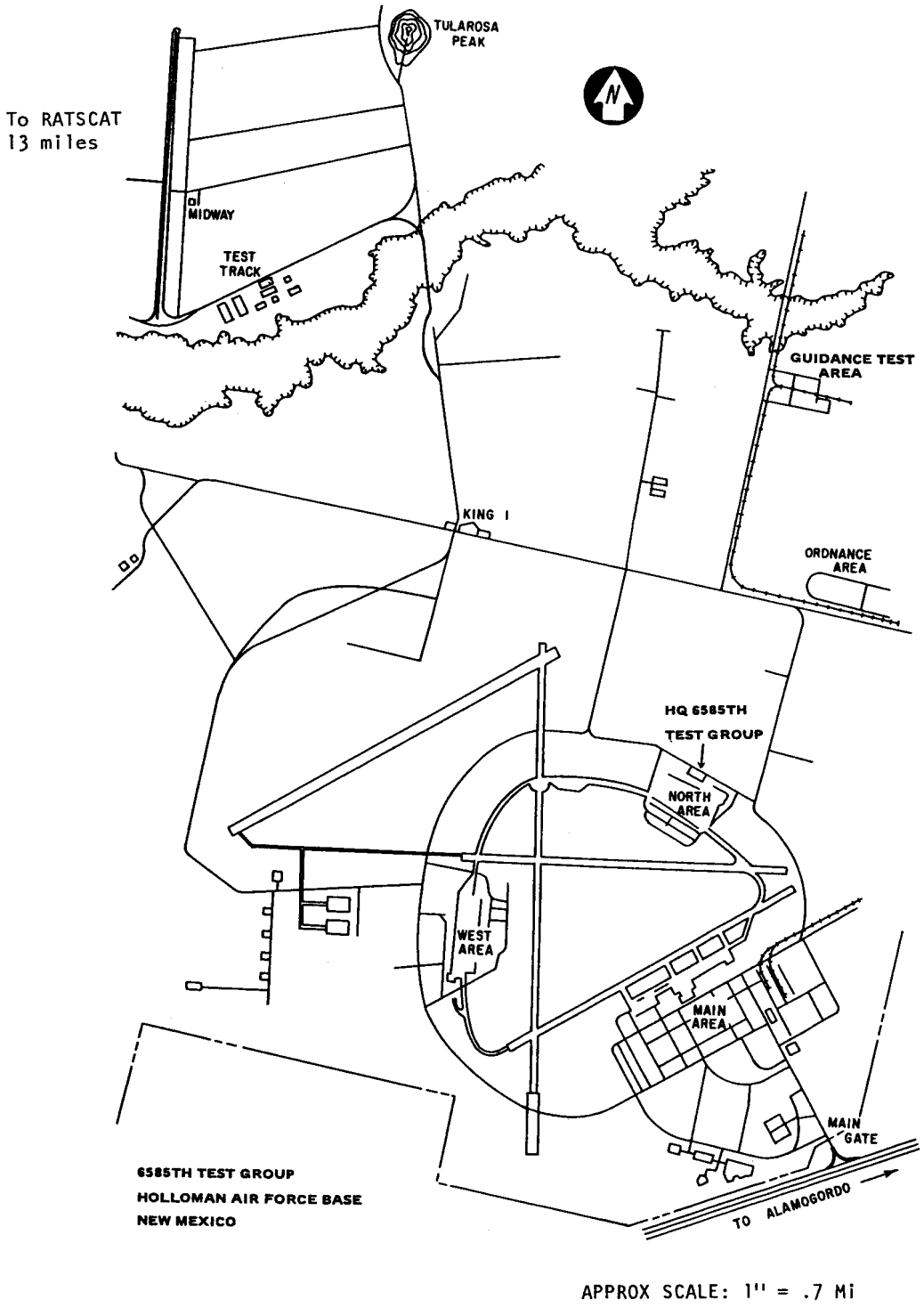


Figure C20.F2. 6585th Test Group, Holloman Air Force Base, New Mexico



C21. CHAPTER 21

AERONAUTICAL SYSTEM DIVISION
4950TH TEST WING

C21.1. MISSION

Performs flight test of military systems, subsystems, and components; operates and maintains a fleet of test support aircraft; provides flight test engineering, Class II aircraft modification design and installation, and technical photographic and data acquisition services for R&D flight tests; manages AFSC Class II aircraft modification policy; and operates the Advanced Range Instrumentation Aircraft (ARIA) in support of other ranges and special missions on a worldwide basis.

C21.2. LOCATION

The 4950th Test Wing is located on Wright-Patterson AFB, near Dayton, Ohio.

C21.3. CAPABILITIES

C21.3.1. The 4950th Test Wing has the capability to plan, conduct, evaluate, and report on R&D flight tests of military systems, subsystems, and components. This includes the capability to design, install, and operate all types of airborne instrumentation.

C21.3.2. The 4950th Test Wing also has the capability to design, procure, fabricate, and install Class II aircraft modifications. Special areas of expertise and experience include aircraft electrical systems, structures (including radomes), pneumatics, and avionics. Sophisticated equipment is available for nondestructive inspections, wind-tunnel model measurement, metal dimensions, contour measurement, and advanced computer-aided design and manufacturing capability.

C21.3.3. Technical photographic support for all AFSC organizations at Wright-Patterson AFB and other R&D projects is provided.

C21.3.4. Maintains an inventory of aircraft, including C-135s, C-141s, C-130s, C-18s, T-37s and T-39s, and other specially modified aircraft to support specific types of flight tests, such as electronics countermeasures, identification friend or foe, airborne lasers, and inertial navigation systems. Flight tests are conducted at

Wright-Patterson AFB, Edwards AFB, Eglin AFB, Kirtland AFB, and other worldwide locations.

C21.3.5. Flight Test Range airspace is available near Wright-Patterson AFB. The 4950th Test Wing operates range instrumentation systems at Wright-Patterson AFB including M-33 tracking radar and a precision approach area tracking system (laser system with a range of 15 miles).

C21.3.6. The ARIA fleet consists of seven dedicated special-purpose C-135 aircraft modified to serve as airborne telemetry terminals. The aircraft are deployed on a global basis to cover launch activity at either Eastern Space and Missile Center or Western Space and Missile Center. The ARIA provides acquisition, tracking, recording, retransmission of telemetry signals, and voice relay of transmissions from spacecraft, aircraft, and ground stations. ARIA fleet conversion to six C-18 and two C-135 aircraft is programed in FYs 1983 through 1988.

C21.4. TYPICAL PROJECTS SUPPORTED

C21.4.1. Flight testing in support of electronic warfare, electro-optics weapons, and navigation and communication testing, including ASC 30 Satellite Communications, Extra High Frequency Electronic Warfare Systems, NAVSTAR Global Positioning System, and Aerial Refueling Systems.

C21.4.2. Air worthiness testing of modified aircraft including Sabre Cross and IARS Hose Reel.

C21.4.3. ARIA support to ESMC (Trident, Titan III, Pershing II, Chevaline, and Poseidon); WSMC (Space Programs A/B/C/D, Defense Met Satellite Program, and Global Positioning System); and Cruise Missile Programs (Air Launch Cruise Missile and Ground Launch Cruise Missile). Also support to NASA including Special Interest Launches (SILs), INTELSAT V-C/V-D/V-E, and INSTAT - lA. Future ARIA support planned for Peacekeeper Program.

C21.4.4. Airborne Laser Laboratory (ALL) - Det 2, Kirtland AFB, NM.

C21.4.5. Central Inertial Guidance Test Facility (CIGTF) Support - Holloman AFB, NM.

C21.4.6. Air Force Geophysics Laboratory (AFGL) Support - Wright-Patterson AFB, OH.

C21.4.7. Speckled Trout - Det 1, Andrews AFB, MD.

C21.5. POINT OF CONTACT

4950th TW/RM
Wright-Patterson AFB, OH 45433
Telephone: AUTOVON: 787-2278
Commercial: 513-257-2278

Figure C21.F1. 4950th Test Wing Restricted Area

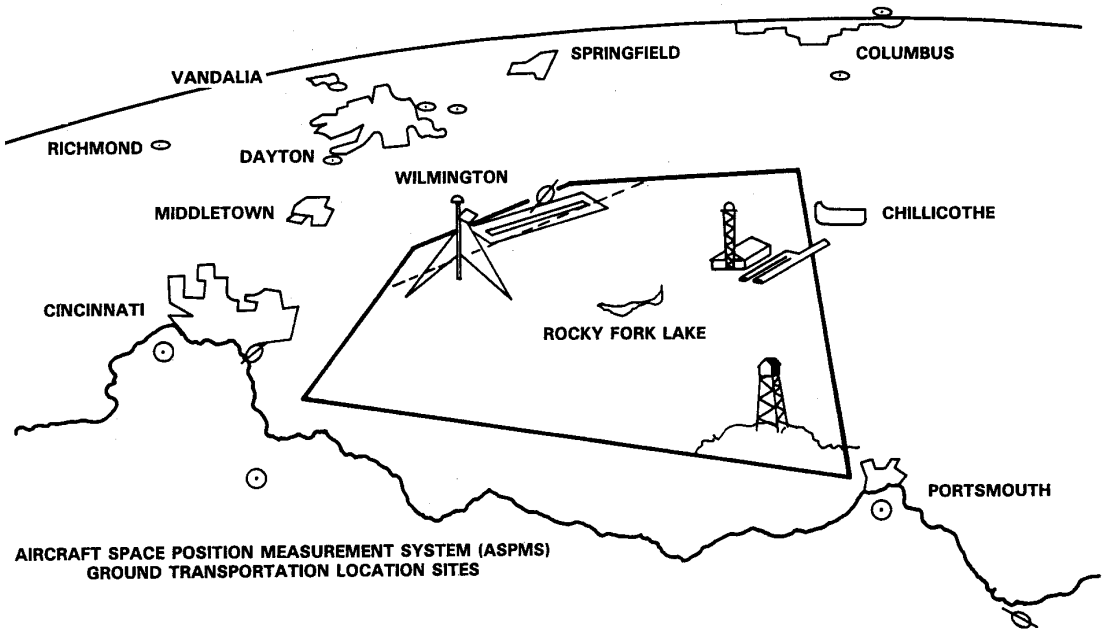


Figure C21.F2. 4950th Test Wing Wright-Patterson AFB